

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
GEORGE D. NORDENHOLT, Director

DIVISION OF MINES
FERRY BUILDING, SAN FRANCISCO

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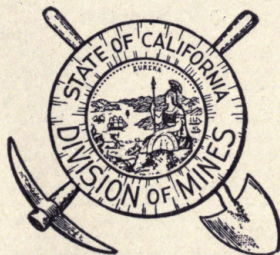
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CALIFORNIA MINERAL PRODUCTION AND DIRECTORY OF MINERAL PRODUCERS FOR 1937

By
HENRY H. SYMONS



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LETTER OF TRANSMITTAL

September, 1938

*To His Excellency, THE HONORABLE FRANK F. MERRIAM,
Governor of the State of California.*

SIR: I have the honor to herewith transmit Bulletin No. 116 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total values, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

GEORGE D. NORDENHOLT,
Director, Department of Natural Resources.

INTRODUCTION

It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in making this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,
State Mineralogist.

MINERAL INDUSTRY, CALIFORNIA, 1937

DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA

CHAPTER ONE

The total value for the mineral output for California for the year 1937 was \$361,515,951, being an increase of \$33,711,683 over the total of 1936 which was \$327,804,268. There were fifty-seven different mineral substances, exclusive of a segregation of the various stones grouped under gems; and all fifty-eight counties of the state contributed to the list.

As revealed by the data following, the salient features of 1937 compared with the previous year were: All groups such as fuels, metals, industrial minerals, and salines, with the exception of the structural materials, showed an increase in total value. Of the individual mineral products, petroleum showed the greatest increase in value and output, followed in turn by gold, natural gas, brick and hollow building-tile, silver, tungsten ore, potash, mineral water, copper, miscellaneous stone, borates, quicksilver, limestone, diatomite, and others; while those showing a decrease in amount and value were cement, granite, magnesium salts, platinum, bituminous rock, pyrite, pumice and volcanic ash, salt, and slate.

Of the fuels, petroleum showed an increase in value of \$26,178,687, and an increase in amount of from 214,776,227 barrels to 238,558,562 barrels of crude oil. The average price received for all grades of crude oil was an increase over that received in 1936 although there was no change in the price of crude from June, 1936. Natural gas showed an increase in value and amount from 298,922,708 M cu. ft. worth \$18,585,970 to 323,883,714 M cu. ft., worth \$19,859,865.

Of the metals, the gold output increased from 1,077,442 fine ounces to 1,174,578 fine ounces; and in value from \$37,710,470 to \$41,110,230. Silver increased from 2,103,799 fine ounces worth \$1,629,392 to 2,888,265 fine ounces worth \$2,234,073; copper from 9,991,799 lbs. worth \$919,245, to 10,512,500 lbs. worth \$1,272,013, with all other metals showing an increase in output except iron ore and the platinum metals, which showed a slight decrease.

Of the structural materials, miscellaneous stone increased in value from \$16,578,238 to \$16,917,683 with also lime, marble, magnesite, and sandstone showing increased total values. Cement declined in amount and value from 13,300,188 barrels valued at \$18,314,589, to 12,072,062 barrels worth \$16,546,229, with all other substances in the group showing lower total values than the previous year.

In the industrial group, the total value increased from \$5,236,534 to \$6,159,918, and with most of the important mineral products therein showing increases, noteworthy were diatomite, limestone, mineral water, pottery clay, gypsum, silica, talc and soapstone. Slight decreases were registered by feldspar, pumice and volcanic ash, and pyrite.

The total value of the saline group increased from \$12,416,349 to \$13,216,270, with all the larger products showing an increased value with the exception of salt and magnesium salts.

By Substances.

The following table shows the comparative yield of mineral substances of California for 1936 and 1937, as compiled from the returns received at the State Division of Mines, San Francisco, in answer to inquiry sent to producers:

Substance	1936		1937		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Bentonite (fuller's earth)....	10,185 tons	\$165,131	8,425 tons	\$140,261	\$24,870—
Borates.....	313,389 tons	5,911,093	326,099 tons	6,206,619	295,526+
Brick & hollow building tile.....		2,240,905		3,083,902	842,997+
Cement.....	13,300,188 bbls.	18,314,589	12,072,062 bbls.	16,546,229	1,768,360+
Chromite.....	221 tons	3,314	1,918 tons	20,830	17,516+
Clay (pottery).....	382,823 tons	646,920	354,669 tons	705,200	58,280+
Coal.....	370 tons	1,815	*	*	* +
Copper.....	9,991,799 lbs.	919,245	10,512,500 lbs.	1,272,013	352,768+
Dolomite.....	*	*	12,371 tons	24,603	* —
Feldspar.....	3,430 tons	24,959	2,686 tons	10,930	14,029+
Gems.....		2,878		2,075	803—
Gold.....	1,077,442 fine ozs.	37,710,470	1,174,578 fine ozs.	41,110,230	3,399,760+
Granite.....		244,243		207,738	36,505—
Gypsum.....	143,549 tons	282,703	186,160 tons	384,431	101,728+
Iron ore.....	*	*	5,490 tons	29,340	* —
Lead.....	1,098,545 lbs.	50,533	2,402,110 lbs.	141,724	91,191+
Lime.....	64,275 tons	633,678	69,532 tons	681,277	47,599+
Limestone.....	295,792 tons	661,757	351,755 tons	830,552	168,805+
Magnesium salts.....	3,798 tons	347,838	7,733,918 lbs.	316,669	31,169+
Marbles.....		23,011		23,667	656+
Mineral water.....	19,348,513 gals.	777,899	18,309,729 gals.	1,130,810	352,911+
Natural gas.....	298,922,708 M. cu.ft.	18,585,970	323,883,714 M. cu.ft.	19,859,865	1,273,895+
Petroleum.....	214,776,227 bbls.	211,667,185	238,558,562 bbls.	237,845,872	26,178,687+
Platinum group.....	1,000 fine ozs.	40,669	530 fine ozs.	23,704	16,965—
Pumice and volcanic ash.....	17,132 tons	143,709	10,392 tons	79,005	64,704—
Quicksilver.....	8,758 flasks	671,055	9,995 flasks	837,789	166,734+
Salt.....	398,249 tons	1,227,505	370,431 tons	1,044,325	183,180—
Sandstone.....		9,180		15,680	6,500+
Silica (sand and quartz).....	77,830 tons	310,278	84,313 tons	348,987	38,709+
Silver.....	2,103,799 fine ozs.	1,629,392	2,888,265 fine ozs.	2,234,073	604,681+
Slate.....		49,818		32,572	17,246—
Soapstone and talc.....	25,643 tons	309,287	29,657 tons	347,772	38,485+
Soda.....	144,314 tons	1,412,788	153,685 tons	1,461,087	48,269+
Stone, miscellaneous ^b		16,578,238		16,917,683	339,445+
Tungsten ore.....	236 tons	210,819	611 tons	782,187	571,368+
Zinc.....	29,740 lbs.	1,487	39,643 lbs.	2,577	1,090+
Unapportioned.....		5,993,907		46,813,693	819,786+
Totals.....		\$327,804,268		\$361,515,951	
Net increase.....					\$33,711,683+

* Included under 'Unapportioned.'

^a Includes onyx and travertine.

^b Includes macadam, crushed rock, ballast, rubble, riprap, sand and gravel.

^c Includes barite, bituminous rock, bromine, calcium chloride, carbon dioxide, diatomite, dolomite, iodine, iron ore, magnesite, mica, mineral paint, potash, pyrite, sillimanite-andalusite-cyanite group, tube-mill pebbles, and sulphur.

^d Includes barite, bituminous rock, bromine, carbon dioxide, calcium chloride, coal, diatomite, fluorspar, iodine, magnesite, mica, mineral paint, potash, pyrite, sillimanite-andalusite-cyanite group, sulphur, zircon, tube-mill pebbles.

By Counties.

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1936 and 1937:

County	1936	1937
Alameda.....	\$2,413,115	\$2,476,302
Alpine.....	9,541	22,791
Amador.....	3,617,449	3,917,866
Butte.....	1,393,874	1,798,992
Calaveras.....	3,513,180	3,279,250
Colusa.....	15,483	9,424
Contra Costa.....	1,706,131	1,867,309
Del Norte.....	16,776	30,647
El Dorado.....	2,796,980	2,607,972
Fresno.....	40,245,111	41,178,791
Glenn.....	134,466	136,368
Humboldt.....	78,098	100,715
Imperial.....	256,941	677,401
Inyo.....	1,470,847	1,439,009
Kern.....	65,344,764	74,162,134
Kings.....	9,949,931	11,008,597
Lake.....	341,066	392,585
Lassen.....	66,283	86,240
Los Angeles.....	\$6,227,432	100,337,635
Madera.....	222,592	133,165
Marin.....	222,974	300,204
Mariposa.....	1,130,018	1,270,774
Mendocino.....	35,596	114,705
Merced.....	2,009,328	2,535,126
Modoc.....	32,306	36,990
Mono.....	498,851	804,925
Monterey.....	187,750	262,651
Napa.....	567,153	356,146
Nevada.....	10,322,695	11,385,056
Orange.....	22,132,919	22,659,380
Placer.....	1,554,865	1,754,040
Plumas.....	1,923,777	2,354,957
Riverside.....	4,449,170	4,057,127
Sacramento.....	4,254,685	4,230,689
San Benito.....	348,812	504,510
San Bernardino.....	15,396,166	16,012,330
San Diego.....	582,556	591,479
San Francisco.....	23,870	41,825
San Joaquin.....	461,064	706,620
San Luis Obispo.....	352,346	323,691
San Mateo.....	2,410,807	2,310,784
Santa Barbara.....	9,693,339	10,709,056
Santa Clara.....	675,188	722,903
Santa Cruz.....	2,103,122	2,074,463
Shasta.....	1,699,902	2,199,423
Sierra.....	787,634	974,680
Siskiyou.....	831,103	1,200,351
Solano.....	46,552	145,567
Sonoma.....	185,417	273,063
Stanislaus.....	691,614	940,030
Sutter.....	17,368	22,959
Tehama.....	100,403	65,193
Trinity.....	724,109	721,290
Tulare.....	209,968	314,952
Tuolumne.....	723,469	1,012,180
Ventura.....	17,631,880	19,230,720
Yolo.....	71,609	44,171
Yuba.....	2,893,823	2,587,748
Total value.....	\$327,804,268	\$361,515,951

Total Mineral Production of California, by Years, Since 1887.

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and nonmetal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later Plumas County. Cement increased rapidly from 1902, while crushed

rock, sand and gravel as a group paralleled the cement increase. Quick-silver has been up and down. Mineral water and salt have always been important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915-1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these have since declined, though silver, structural materials and copper increased in 1920-1924, also lead and magnesite in 1923; lead and zinc in 1925; zinc in 1926, with silver declining; an increase in quicksilver in 1927-1928, with declines in other metals and by petroleum. Natural gas showed a steady increase from 1907, and in 1928-1933 its value was second only to petroleum.

In 1929 the annual output of gold was the smallest since its discovery. From 1929 to 1936 there was a rapid increase in gold production, due in part to the raise in its price per ounce.

Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887.....	\$19,785,868	\$13,588,614	\$1,357,144
1888.....	19,469,320	12,750,000	1,380,666
1889.....	16,681,731	11,212,913	368,048
1890.....	18,039,666	12,309,793	384,200
1891.....	18,872,413	12,728,869	401,264
1892.....	18,300,168	12,571,900	561,333
1893.....	18,811,261	12,422,811	608,092
1894.....	20,203,294	13,923,281	1,064,521
1895.....	22,844,663	15,334,317	1,000,235
1896.....	24,291,398	17,181,562	1,180,793
1897.....	25,142,441	15,871,401	1,918,269
1898.....	27,289,079	15,906,478	2,376,420
1899.....	29,313,460	15,336,031	2,660,793
1900.....	32,622,945	15,843,355	4,152,928
1901.....	34,355,981	16,989,044	2,961,102
1902.....	35,069,105	16,910,320	4,692,189
1903.....	37,759,040	16,471,264	7,313,271
1904.....	43,778,348	19,109,600	8,317,809
1905.....	43,069,227	19,197,043	9,097,820
1906.....	46,776,085	18,732,452	9,238,020
1907.....	55,697,949	16,727,928	16,783,943
1908.....	66,363,198	18,761,559	26,566,181
1909.....	82,972,209	20,237,870	32,398,187
1910.....	88,419,079	19,715,440	37,689,542
1911.....	87,497,879	19,738,908	40,552,088
1912.....	88,972,385	19,713,478	41,868,344
1913.....	98,644,639	20,406,958	48,578,014
1914.....	93,314,773	20,653,496	47,487,109
1915.....	96,663,369	22,442,296	43,503,837
1916.....	127,901,610	21,410,741	57,421,334
1917.....	161,202,962	20,087,504	86,976,209
1918.....	199,753,837	16,529,162	127,459,221
1919.....	195,830,002	16,695,955	142,610,563
1920.....	242,099,667	14,311,043	178,394,937
1921.....	268,157,472	15,704,822	203,138,225
1922.....	245,183,826	14,670,346	173,381,265
1923.....	344,024,678	13,379,013	242,731,309
1924.....	374,620,789	13,150,175	274,652,874
1925.....	434,519,660	13,065,330	330,609,829
1926.....	450,330,856	11,923,481	345,546,677
1927.....	366,781,394	11,671,018	260,735,498
1928.....	332,224,233	10,785,315	229,998,680
1929.....	432,248,228	8,526,703	321,366,863
1930.....	365,604,695	9,451,162	271,699,046
1931.....	215,964,420	10,814,162	141,835,723
1932.....	199,196,493	11,765,726	142,890,247
1933.....	206,489,058	15,683,075	143,063,972
1934.....	237,374,709	25,131,284	159,529,671
1935.....	263,404,317	31,165,050	179,335,311
1936.....	327,804,268	37,710,470	211,667,185
1937.....	361,515,951	41,110,230	237,845,872
Totals.....	\$7,663,854,098	\$867,549,748	\$4,859,262,673

CHAPTER TWO

FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values of which make up practically 70 per cent of the State's entire mineral output for the year 1937.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stock-food preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1936 and 1937 is shown in the following table:

Substance	1936		1937		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Coal.....	370 tons	\$1,815	369 tons	\$2,933	\$1,118+
Natural gas.....	289,922,708 M cu.ft.	18,585,970	323,883,714 M cu.ft.	19,859,865	1,273,895+
Petroleum.....	214,776,277 bbls.	211,667,185	238,558,562 bbls.	237,845,872	26,178,687+
Total value.....		\$230,254,970		\$257,708,670	
Net increase.....					\$27,453,700+

COAL

Bibliography: State Mineralogist Reports VII, XII-XV (inc.), XVII, XIX-XXVIII (inc.), XXVI, XXXI. U. S. Geol. Surv., Bulletins 285, 316, 431, 471, 581; Ann. Rept. 22, P. III.

The coal production in California during 1937 totaled 369 short tons valued at \$2,933, as compared with the 1936 output which was 370 short tons worth \$1,815. The material mined 1937 came from a single property each, in Amador, San Benito, and Trinity counties. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

Total Coal Production of California.

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:

Coal Output and Value, by Years

Year	Tons	Value	Year	Tons	Value
1861	6,620	\$38,065	1900	176,956	\$535,531
1862	23,400	134,550	1901	150,724	401,772
1863	43,200	248,400	1902	88,460	248,622
1864	50,700	291,525	1903	93,026	265,383
1865	60,530	348,048	1904	79,062	376,494
1866	84,020	483,115	1905	46,500	144,500
1867	124,690	716,968	1906	24,850	61,600
1868	143,676	826,137	1907	23,734	55,849
1869	157,234	904,096	1908	18,496	55,503
1870	141,890	815,868	1909	49,389	216,913
1871	152,493	876,835	1910	11,033	23,484
1872	190,859	1,097,439	1911	11,047	18,297
1873	186,611	1,073,013	1912	14,484	39,092
1874	215,352	1,238,274	1913	25,198	85,809
1875	166,638	958,169	1914	11,859	28,806
1876	128,049	736,282	1915	10,299	26,662
1877	107,789	619,787	1916	4,037	7,030
1878	134,237	771,863	1917	3,527	7,691
1879	147,879	850,304	1918	6,343	16,149
1880	236,950	1,362,463	1919	2,983	8,203
1881	140,000	805,000	1920	2,078	5,450
1882	112,592	647,404	1921	12,467	63,578
1883	76,162	380,810	1922	27,020	135,100
1884	77,485	309,950	1923	1,010	5,090
1885	71,615	286,460	1924	1,425	8,800
1886	100,000	300,000	1925	730	3,880
1887	50,000	150,000	1926	1,100	5,000
1888	95,000	380,000	1927	200	1,100
1889	121,280	288,232	1928	782	4,542
1890	110,711	283,019	1929	450	2,476
1891	93,301	204,902	1930	10,885	59,858
1892	85,178	209,711	1931	12,551	77,607
1893	72,603	167,555	1932	9,508	36,468
1894	59,887	139,862	1933	2,612	11,367
1895	79,858	193,790	1934	13,549	52,720
1896	70,649	161,335	1935	8,049	32,745
1897	87,449	196,255	1936	370	1,815
1898	143,045	337,475	1937	269	2,933
1899	160,941	420,109			
			Totals	5,267,635	\$23,386,989

The tonnages in the above table for the years 1861-1886 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93-94), being an average of \$5.75 per ton. From 1887 to date the figures are those of the California State Mining Bureau.

NATURAL GAS

Bibliography: State Mineralogist Reports VII, X, XII, XIII, XIV, XXIX. Bulletins 3, 16, 19, 69, 73, 89. Monthly Summary Oil and Gas Supervisor, Dec., 1919; Aug., 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not over-estimated, particularly in the seven oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of

small amounts of gas and transporting it for any considerable distance may not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

Actual Production of Natural Gas—How Disposed of in California—1937

County	Production M cubic feet	Utilized M cubic feet	Wasted M cubic feet	Stored M cubic feet
Fresno.....	70,374,043	2,158,305	941,319	67,274,419
Kern.....	70,926,701	3,371,762	2,412,085	65,142,854
Kings.....	48,253,387	1,621,563	707,225	45,924,599
Los Angeles.....	71,079,837	5,385,823	234,434	65,459,580
Orange.....	24,300,505	636,597	128,212	23,535,696
San Joaquin.....	5,774,712	34,486	-----	5,740,226
Santa Barbara.....	7,667,778	983,900	1,126,257	5,557,621
Ventura.....	46,146,504	1,594,914	448,751	44,102,839
Other counties.....	1,325,003	179,123	-----	1,145,880
Totals.....	345,848,470	15,966,473	5,998,283	323,883,71

Production and Value.

There is a rather wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1937 gave from 1.5¢ to 85¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1937 works out at approximately 6.13¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr. are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

Utilized Production of Natural Gas in California, 1937

County	M cubic feet	Value
Fresno.....	67,274,419	\$4,308,280
Kern.....	65,142,854	3,950,521
Kings.....	45,924,599	2,944,800
Los Angeles.....	65,459,580	4,655,204
Orange.....	23,535,696	1,599,811
San Joaquin.....	5,740,226	484,381
Santa Barbara.....	5,557,621	328,572
Ventura.....	44,102,839	1,457,709
Butte, Humboldt, Lake, Mendocino, Monterey, Sacramento, Solano, Sutter, Tulare*	1,145,880	130,587
Totals.....	323,883,714	\$19,859,865

* Combined to conceal the output of individual operators in each.

The above totals showed an increase in amount and value compared with the figures of the previous year, which were 298,922,708 M. cu. ft. worth \$18,585,970. Los Angeles County led in the yield of natural gas during 1937, followed in turn by Fresno and Kern counties. Increased value of output was shown by Fresno, Kern,

Kings, Orange, San Joaquin, and Santa Barbara counties; while a decrease was shown by Los Angeles and Ventura counties.

Natural Gas Production in California Since 1888.

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in California was from the famous courthouse well at Stockton, bored in 1854-1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells.

Natural Gas Production in California Since 1888

Year	M cubic feet	Value	Year	M cubic feet	Value
1888	a12,000	\$10,000	1914	16,529,963	\$1,049,470
1889	a14,500	12,680	1915	21,992,892	1,706,480
1890	a41,250	33,000	1916	28,134,365	2,871,751
1891	a39,000	30,000	1917	44,343,020	2,964,922
1892	a75,000	55,000	1918	46,373,052	3,289,524
1893	a84,000	68,500	1919	52,173,503	4,041,217
1894	a b85,000	75,000	1920	58,567,772	3,898,286
1895	a b110,000	100,000	1921	67,043,797	4,704,678
1896	a b131,000	110,157	1922	103,628,027	6,990,030
1897	a71,300	62,657	1923	240,405,397	15,661,433
1898	a111,165	74,424	1924	209,021,596	15,153,140
1899	115,110	95,000	1925	194,719,924	15,890,082
1900	40,566	34,578	1926	214,549,477	19,465,347
1901	120,800	92,034	1927	224,686,940	20,447,294
1902	120,968	99,443	1928	260,887,116	22,260,947
1903	120,134	75,237	1929	400,129,201	29,675,546
1904	144,437	91,035	1930	315,513,952	24,559,840
1905	148,345	102,479	1931	344,959,920	16,690,695
1906	168,175	109,489	1932	284,168,872	16,272,061
1907	169,991	114,759	1933	271,743,544	15,403,514
1908	842,883	474,584	1934	263,207,517	14,408,761
1909	1,148,467	616,932	1935	302,447,193	17,680,661
1910	10,579,933	1,676,367	1936	298,922,708	18,585,970
1911	a5,000,000	491,859	1937	323,883,714	19,859,565
1912	a12,600,000	940,076			
1913	14,210,836	1,053,292	Totals	4,635,238,322	\$320,230,116

a Quantity, in part, estimated, where values only were reported.

b Tabulations published previously to 1933 included values of CO₂, now shown under "Industrial Materials."

Gasoline from Natural Gas.

More or less gas usually accompanies the petroleum in the old fields, and such gas carries varying amounts of gasoline. A total of 94 plants were in operation in 1937 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

A total of 649,774,253 gallons of casing-head gasoline valued at \$40,051,437 was reported made from all fields in California by 94 plants during 1937 compared with 603,053,878 gallons worth \$33,211,791 from 91 plants in 1936. The 1937 output was distributed as follows:

County	No. plants	Gallons	Value
Fresno.....	7	111,161,436	\$6,671,186
Kern.....	19	65,254,770	3,777,754
Kings.....	7	83,475,760	5,000,415
Los Angeles.....	34	236,254,489	15,088,335
Orange.....	12	74,670,356	4,626,242
Santa Barbara.....	9	17,868,846	943,372
Ventura.....	11	61,188,596	3,944,133
Totals.....	94	649,774,253	\$40,051,437

The usual recoveries of gasoline from natural gas vary from $\frac{1}{2}$ gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Report by Knudsen ¹ gives the average recovery for 1937 as 1.659 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

	M cubic feet natural gas treated	Gallons of gasoline recovered	Recovery gallons per M cu. ft.
Oil absorption.....	323,759,216	20,101,986	1.659

PETROLEUM

Bibliography: State Mineralogist Reports IV, VII, X, XII, XIII, XXIX, XXXI, XXXIII. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on). U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1937 amounted to a total of 238,558,562 barrels having a value of \$237,845,872 at the well. This was an increase in both amount and value as compared with the 1936 output which was 214,776,227 barrels worth \$211,667,185.

This total of quantity is compiled from the monthly production reports filed by the operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929-1933 values, used by the Division of Mines, were obtained by using the production of crude oil by gravities produced in

¹Knudsen, E. T., The Petroleum Situation in the Pacific Coast Territory (Monthly for 1937), U. S. Bureau of Mines.

each field¹ and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

The value given to the 1934-1937 petroleum output by this department was obtained by using the average gravity oil for each field, to which was applied the average quotation for the year of said grade oil.

TABLE A
Production and Value of Crude Oil by Counties

County	1936		1937	
	Barrels	Value	Barrels	Value
Fresno.....	30,035,864	\$36,317,189	29,091,322	\$36,521,804
Kern.....	62,273,932	53,781,287	69,878,714	61,905,918
Kings.....	5,317,882	7,115,273	5,800,589	8,062,833
Los Angeles.....	72,629,599	70,758,648	86,659,477	83,922,309
Orange.....	21,685,351	20,321,674	22,060,820	20,854,524
Santa Barbara.....	7,149,077	8,174,953	8,273,815	8,961,642
Ventura.....	15,569,523	15,118,061	16,720,713	17,562,688
San Bernardino, San Luis Obispo, Santa Clara, Tulare*	114,899	80,100	73,112	54,154
Totals.....	214,776,227	\$211,667,185	238,558,562	\$237,845,972

* Combined to conceal the output of operators in each.

The foregoing totals show an average price of \$0.997 per barrel for the year 1937, as compared with \$0.986 in the year 1936, \$0.870 in 1935, \$0.913 in 1934, \$0.831 in 1933, and \$0.807 in 1932.

TABLE B
Average Price of Oil per Barrel, by Counties, 1928-1937

County	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Fresno.....	\$0.764	\$0.519	\$0.568	\$0.551	\$0.556	\$0.573	\$0.650	\$0.941	\$1.209	\$1.255
Kern.....	.835	.741	.838	.636	.658	.665	.729	.729	.863	.886
Kings.....		1.674	1.515	.723	.837	.934	1.085	1.045	1.338	1.390
Los Angeles.....	1.051	1.189	1.297	.784	.860	.892	.990	.914	.974	.968
Orange.....	.935	.986	1.060	.753	.762	.827	.937	.898	.937	.945
San Luis Obispo.....					.550					
Santa Barbara.....	1.108	1.255	1.404	.954	.962	.848	.951	.924	1.143	1.083
Santa Clara.....					.550					
Ventura.....	1.098	1.150	1.396	.771	.849	.838	.944	.901	.971	1.050
State averages....	\$0.992	\$1.094	\$1.195	\$0.753	\$0.807	\$0.831	\$0.913	\$0.970	\$0.986	\$0.997

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the history of California. Some also was shipped to refineries at San

¹ By courtesy of Standard Oil Company of California.

Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,¹ in 1874 production amounted to 36 bbl. per day from natural flows in Pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877."²

In 1877 Pico averaged 40-50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rincon, Ventura County, were the new

¹ Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.

² *Idem*, p. 301.

fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

During 1929 Playa del Rey was added to the oil fields in Los Angeles County, and more recently a number of others have been added in Los Angeles, Kern, and Santa Barbara.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

TABLE C
Total Petroleum Production in California

Year	Barrels	Value	Year	Barrels	Value
To and including 1875.....	*175,000	^b \$472,500	1907.....	40,311,171	\$16,783,943
1876.....	12,000	30,000	1908.....	48,306,910	26,566,181
1877.....	13,000	29,250	1909.....	58,191,723	32,398,187
1878.....	15,227	30,454	1910.....	77,697,568	37,689,542
1879.....	19,858	39,716	1911.....	84,648,157	40,552,088
1880.....	40,552	60,828	1912.....	89,689,250	41,868,344
1881.....	99,862	124,828	1913.....	98,494,532	48,578,014
1882.....	128,636	257,272	1914.....	102,881,907	47,487,109
1883.....	142,857	285,714	1915.....	91,146,620	43,503,837
1884.....	262,000	655,000	1916.....	90,262,557	57,421,334
1885.....	325,000	750,750	1917.....	95,396,309	86,976,209
1886.....	*377,145	^b \$870,205	1918.....	99,731,177	127,459,221
1887.....	678,572	1,357,144	1919.....	101,182,962	142,610,563
1888.....	690,333	1,380,666	1920.....	103,377,361	178,394,937
1889.....	303,220	368,048	1921.....	112,599,860	203,138,225
1890.....	307,360	384,200	1922.....	138,468,222	173,381,265
1891.....	323,600	401,264	1923.....	262,875,690	242,731,309
1892.....	385,049	561,333	1924.....	228,933,471	274,652,874
1893.....	470,179	608,092	1925.....	232,492,147	330,609,829
1894.....	783,078	1,064,521	1926.....	224,673,281	345,546,677
1895.....	1,245,339	1,000,235	1927.....	231,195,774	260,735,498
1896.....	1,257,780	1,180,793	1928.....	231,811,465	229,998,680
1897.....	1,911,569	1,918,269	1929.....	292,534,221	321,366,863
1898.....	2,249,088	2,376,420	1930.....	227,328,988	271,699,046
1899.....	2,677,875	2,660,793	1931.....	188,310,605	141,835,723
1900.....	4,319,950	4,152,928	1932.....	177,745,286	142,890,247
1901.....	7,710,315	2,961,102	1933.....	172,139,362	143,063,972
1902.....	14,356,910	4,692,189	1934.....	174,721,282	159,529,671
1903.....	24,340,839	7,313,271	1935.....	205,979,855	179,335,311
1904.....	29,736,003	8,317,809	1936.....	214,776,227	211,667,185
1905.....	34,275,701	9,007,820	1937.....	238,558,562	237,845,872
1906.....	32,624,000	9,238,020	Totals.....	4,898,720,399	\$4,862,869,190

* U. S. G. S., Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

^b Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.

Well Data.

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D
Wells Operated, by Fields, 1937

Field	Wells producing Dec., 1936	Wells producing Dec., 1937	Wells com- pleted during year	Daily initial output	Wells aban- doned during year	Bbls. per well produced per day Dec., 1936	Bbls. per well produced per day Dec., 1937
GROUP NO. 1—Belridge—North.....	40	50	14	45,040	1	276.6	323.0
Belridge—South.....	156	127	1	130	-----	12.8	12.2
Canal.....	-----	1	1	2,267	-----	-----	467.0
Coalinga.....	821	914	2	22	31	19.0	16.5
Edison.....	89	89	10	1,035	13	62.1	42.5
Elk Hills.....	151	170	6	987	13	57.8	64.5
Fruitvale.....	128	159	38	10,241	22	62.0	54.6
Greeley.....	1	10	10	22,245	4	11.0	377.2
Kern River.....	1,300	1,334	71	10,984	18	10.9	11.5
Kettleman, M. D.....	3	3	-----	-----	1	125.3	29.3
Kettleman, N. D.....	122	179	30	39,542	2	652.8	459.1
Lost Hills.....	271	204	21	3,291	7	13.6	18.0
McKittrick.....	126	217	9	665	5	16.9	20.1
Midway-Sunset.....	2,313	2,525	123	32,585	64	25.4	29.4
Mountain View.....	172	196	40	18,059	2	153.4	79.2
Mt. Poso.....	235	278	53	13,053	19	78.4	75.3
Rio Bravo.....	-----	1	1	2,550	-----	-----	2,559.0
Round Mountain.....	113	161	53	18,632	13	95.6	106.6
Ten Section.....	2	8	7	19,824	5	257.5	457.8
Wheeler Ridge.....	26	28	-----	-----	-----	13.5	11.1
GROUP NO. 2—Capitan.....	25	40	7	1,985	1	62.4	75.4
Elwood.....	78	83	1	320	4	156.9	92.1
Rincon.....	29	36	7	5,019	1	71.1	85.3
San Miguelito.....	9	15	5	3,071	1	176.1	246.0
Santa Barbara.....	56	36	-----	-----	13	24.6	15.8
Santa Maria.....	198	285	64	56,564	13	23.0	48.6
Summerland.....	19	19	-----	-----	-----	1.8	1.6
Ventura Avenue.....	245	254	20	12,415	1	104.6	140.5
Ventura-Newhall.....	567	578	20	3,273	14	8.2	8.6
Watsonville.....	7	7	-----	-----	-----	8.6	8.6
GROUP NO. 3—Brea-Orinda.....	360	347	-----	-----	-----	22.5	17.7
Coyote—East.....	77	83	9	1,904	4	32.3	49.7
Coyote—West.....	48	33	2	378	4	172.7	280.4
Dominguez.....	130	164	17	9,845	2	204.1	181.0
El Segundo.....	4	49	49	52,059	7	101.8	407.2
Huntington Beach.....	521	573	29	5,009	9	69.5	61.8
Inglewood.....	201	195	4	5,788	9	61.8	83.3
Lawndale.....	6	6	-----	-----	1	22.3	14.8
Long Beach.....	1,242	1,242	24	5,038	49	55.0	46.8
Los Angeles-Salt Lake.....	122	113	-----	-----	14	6.8	5.0
Montebello.....	196	206	7	1,357	7	44.7	35.1
Newport.....	-----	-----	-----	-----	5	-----	-----
Playa del Rey.....	212	203	5	1,308	15	59.9	37.5
Potrero.....	10	11	1	176	2	30.7	78.7
Richfield.....	260	282	22	2,823	1	25.7	35.7
Rosecrans.....	77	83	6	3,282	2	28.5	67.4
Santa Fe Springs.....	633	659	3	596	34	71.0	62.2
Seal Beach.....	101	109	2	165	4	93.7	85.1
Torrance.....	533	531	18	2,235	10	14.7	14.3
Whittier.....	158	155	-----	-----	1	10.0	5.9
Wilmington.....	-----	348	335	22,004	1	-----	179.5
GROUP NO. 1—Gas Fields:	-----	-----	-----	-----	-----	-----	-----
Buena Vista Lake.....	5	5	-----	-----	-----	-----	-----
Buttonwillow.....	22	16	-----	-----	-----	-----	-----
Chowchilla.....	-----	-----	-----	-----	-----	-----	-----
Delano.....	-----	1	-----	-----	-----	-----	-----
Dudley Ridge.....	-----	-----	-----	-----	1	-----	-----
Goleta.....	3	1	-----	-----	-----	-----	-----
McDonald Island.....	-----	4	2	Gas	-----	-----	-----
Rio Vista.....	1	11	15	Gas	-----	-----	-----
Semi-Tropic.....	-----	20	-----	-----	-----	-----	-----
Tracy.....	6	6	-----	-----	-----	-----	-----
Miscellaneous drilling.....	-----	-----	-----	-----	118	-----	-----
Totals.....	12,230	13,463	1,164	617,766	587	48.1	52.4

Specific Gravity of Oils Produced.

The proportion of heavy and light oil produced in the various fields is shown in Table E, following, for which we are indebted to the Stand-

ard Oil Company. Specific gravities in California range from 8° Baumé in the Casmalia field, Santa Barbara County, to 60° in Kettleman Hills, Kings County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Maricopa; Wheeler Ridge, Kern County.

TABLE E
Production of Light and Heavy Oils, by Fields, for 1937

Field	Under 20° (barrels)	20° and above (barrels)	Total (barrels)
San Joaquin Valley—			
Belridge—North.....	939	5,718,191	5,719,130
Belridge—South.....	219,477	416,666	636,143
Canal.....		31,364	31,364
Coalinga.....	2,057,972	3,699,915	5,757,887
Comanche Point.....		1,450	1,450
Edison.....	676,912	873,689	1,550,601
Fruitvale.....	1,435,857	1,744,930	3,180,787
Elk Hills.....	776,287	3,010,772	3,787,059
Greeley.....		527,099	527,099
Kern River.....	4,978,124		4,978,124
Kettleman Hills, M. D.....		49,754	49,754
Kettleman Hills, N. D.....		29,081,905	29,081,905
Lost Hills.....	772,766	629,462	1,402,228
McKittrick.....	1,286,909	4,270	1,291,179
Midway-Sunset.....	9,525,429	16,943,816	26,469,245
Mountain View.....	8,554	6,667,278	6,675,832
Mount Poso.....	6,513,792		6,513,792
Poso Creek.....	719,079		719,079
Rio Bravo.....		127,788	127,788
Round Mountain.....	4,593,173	265,523	4,858,696
Ten Section (Old River).....		932,427	932,427
Wheeler Ridge.....		118,620	118,620
Coastal—			
Arroyo Grande.....	22,967	14,846	37,813
Capitan.....		918,458	918,458
Elwood.....		3,205,137	3,205,137
Lompoc.....	85,862	48,443	134,305
Newhall.....	7,048	96,746	103,794
Rincon.....		1,059,565	1,059,565
San Miguelito.....		1,146,506	1,146,506
Santa Barbara Mesa.....	246,298	1,510	247,808
Santa Maria.....	2,627,255	1,082,028	3,709,283
Summerland.....	11,900		11,900
Ventura Avenue.....		12,685,100	12,685,100
Ventura County.....	51,307	1,680,590	1,731,897
Watsonville.....	22,040		22,040
Southern California—			
Coyote—East.....	38,005	1,359,643	1,397,648
Coyote—West.....		2,887,816	2,887,816
Del Rey.....	108,653	3,059,466	3,168,119
Dominguez.....		9,837,311	9,837,311
El Segundo.....	3,682	3,628,414	3,632,096
Huntington Beach.....	529,963	12,735,163	13,265,126
Inglewood.....	539,943	4,989,340	5,529,283
Lawndale.....		31,451	31,451
Long Beach.....	60,976	21,785,283	21,846,259
Los Angeles.....	73,537		73,537
Montebello.....	169,130	2,996,488	3,165,618
Olinda Brea.....	233,165	2,421,438	2,654,603
Potrero.....		112,987	112,987
Richfield.....	487,216	2,678,577	3,165,793
Rosecrans.....		1,256,499	1,256,499
Salt Lake.....	166,360		166,360
Santa Fe Springs.....	12,921	15,721,633	15,734,554
Seal Beach.....		3,409,688	3,409,688
Torrance.....	1,909,019	934,478	2,843,497
Whittier.....	225,153	109,439	334,592
Wilmington.....	8,172,944	5,900,803	14,073,747
Miscellaneous.....		3,340	3,340
Grand totals.....	49,370,614	188,643,105	238,013,719

Oil in "Storage."

Field, refinery, pipe-line and tank-farm stocks of crude and refined products in the Pacific Coast¹ territory totaled 128,040,247 barrels December 31, 1937, as compared with 131,343,736 barrels on December 31, 1936. The total decrease in stock over the preceding year was 3,303,489 barrels.

	Dec. 31, 1936 (barrels)	Dec. 31, 1937 (barrels)
1. Fuel oil residuum and nongasoline-bearing crude	65,487,937	67,657,050
2. Gas oil and Diesel oil	8,958,060	6,819,579
3. Gasoline-bearing crude	33,770,339	30,410,671
4. Unblended natural gasoline	1,828,636	2,001,204
5. Gasoline (not including distributing and service stations)	12,384,540	13,520,678
6. Naphtha distillates	*1,387,940	*1,464,577
7. All other stocks	*7,526,284	*6,166,488
Totals.....	131,343,736	128,040,247
*Estimated amount of unfinished gasoline contained in item No. 6	1,133,326	1,248,291
*Coke included in item No. 7.....	246,292	22,435

During 1937 the crude oil consumed in California, according to the U. S. Bureau of Mines² was 205,779,626 barrels sent to stills at the refineries; 20,801,587 barrels to foreign shipments; 121,170 barrels to intercoastal shipments; and 22,849,931 barrels were either consumed as fuel or added to residuum and nongasoline-bearing crude.

Utilization of California's Crude Oil.

Most of the crude oil produced in California is sent to storage reservoirs at tank farms near the oilfields and from these reservoirs by pipelines to the refineries, the larger ones of which are located in the vicinity of Los Angeles and on San Francisco Bay.

The production of petroleum products during 1936 is shown in Table F:

TABLE F

Commodity	Amount in barrels
Crude petroleum.....	205,779,262
Natural gasoline including liquid petroleum gas.....	15,274,387
Gasoline.....	80,579,663
Kerosene.....	5,026,911
Lubricating oils and greases.....	2,567,731
Gas oil and Diesel oil.....	28,609,120
Residuum nongasoline-bearing crude ^a	86,845,635
Asphalt and road oils.....	6,586,163
Coke (in tons).....	626,948
Naphtha distillates.....	1,388,102
Other unfinished oils.....	916,309
Shortage and still gas production.....	6,587,133
Total petroleum (net) ^b	243,903,944

^a Includes 22,849,913 bbls. of heavy crude oil.

^b Total of crude oil and natural gas gasoline.

¹ American Petroleum Institute: Summary of California Oilfield Operations for December, 1937.

² Knudsen, E. T., The petroleum situation in the Pacific Coast territory (monthly) 1937, U. S. Bureau of Mines.

CHAPTER THREE

METALS

Bibliography: Reports of State Mineralogist I-XXXIV (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95, 108. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The total value of metals produced in California during 1937 was \$46,454,467. Chief among these is and always has been gold, followed by silver, copper, quicksilver, tungsten ore, lead, iron ore, platinum, and chromite.

A comparison of the 1936 output with that of the 1937 output is afforded by the following table:

Substance	1935		1936		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Chromite.....	221 tons	\$3,314	1,918 tons	\$20,830	\$17,516+
Copper.....	9,991,799 lbs.	919,245	10,512,500 lbs.	1,272,013	352,768+
Gold.....	1,077,442 fine ozs.	37,710,470	1,174,578 fine ozs.	41,110,230	3,399,760+
Iron ore.....	*	*	5,490 tons	29,340	*
Lead.....	1,098,545 lbs.	50,533	2,402,110 lbs.	141,724	91,191+
Platinum group metals.....	1,134 ozs.	40,669	530 ozs.	23,704	16,965—
Quicksilver.....	8,758 flasks	671,055	9,985 flasks	837,789	166,734+
Silver.....	2,103,799 fine ozs.	1,629,392	2,888,265 fine ozs.	2,234,073	604,681+
Tungsten.....	236 tons	210,819	611 tons	782,187	571,368+
Zinc.....	29,740 lbs.	1,487	39,643 lbs.	2,577	1,090+
Unapportioned*		155,434			
Total values.....		\$41,392,418		\$46,454,467	
Net increase.....					\$5,062,049—

* Includes iron ore and manganese ore.

* Included under 'Unapportioned.'

ALUMINUM

Bibliography: Report XVIII, p. 198. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this state, being in Riverside County southeast of Corona, but as yet undeveloped.

ANTIMONY

Bibliography: State Mineralogist Reports VIII, X, XII-XV (inc.), XVII, XXII, XXIII, XXV-XXVII (inc.), XXXI. Bulletins 38, 91.

During 1936 there were no shipments of antimony ore in California. The principal commercial production of antimony in California has come from Kern, Inyo and San Benito counties, and other occurrences have been noted in Nevada, Riverside, San Bernardino and Santa Clara counties. The commonest occurrence is in the form of the sulphide, stibnite; but in the Kernville and Havilah districts in Kern

County there were notable deposits of the native metal, being among the few localities of the world where native antimony has been found.

Present New York quotations (July 14, 1938) are around 14¢ per pound for Chinese (duty paid) and 11½¢ for domestic antimony.

Antimony Production in California, by Years.

The production of antimony ore in California by years since 1887 has been as follows:

Year	Tons	Value	Year	Tons	Value
1887.....	75	\$15,500	1902.....		
1888.....	100	20,000	1915.....	510	\$35,666
1889.....			1916.....	1,015	64,793
1893.....	50	2,250	1917.....	158	18,786
1894.....	150	6,000	1918.....		
1895.....	33	1,485	1925.....	*26	770
1896.....	17	2,320	1926.....		
1897.....	20	3,500	1927.....	20	590
1898.....	40	1,200	1928.....	20	761
1899.....	75	13,500	1929.....		
1900.....	70	5,700			
1901.....	50	8,350	Totals.....	2,429	\$201,171

* Annual details concealed under 'Unapportioned.'

ARSENIC

Bibliography: Reports XVIII, XXIII, XXV, XXX, XXXIII. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite (FeAsS), which is frequently gold bearing; and in scorodite ($\text{FeAsO}_4 + 2\text{H}_2\text{O}$), an oxidation product of arsenopyrite. The occurrence of realgar (AsS) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from California ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

BERYLLIUM

Bibliography: State Mineralogist Report XXVII. Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of beryllium minerals, but none have been found in commercial quantities, except beryl, which is a beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.

Present (May 26, 1938) quotations for beryllium ore are per ton in carload lots, minimum 10 per cent BeO, \$30; minimum 12 per cent BeO, \$35, f.o.b. mine.

Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and northwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

BISMUTH

Bibliography: Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at \$2,400 in 1904, and credited to Riverside County.

The present quotation (June 16, 1938) for bismuth is \$1.05 per pound, in ton lots for the refined metal.

CADMIUM

Bibliography: U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from California ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

The present quotation (July 28, 1937) for cadmium is 85¢ per pound for the refined metal.

CHROMITE

Bibliography: State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI-XXIX (inc.), XXXI, XXXIII. Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During the year 1937 there were shipments of chromite or chromic iron ore in California amounting to 1,918 short tons, recalculated to a basis of 45% Cr₂O₃, valued at \$20,830 f.o.b. shipping point, coming from two properties in Del Norte County and one each in El Dorado, Fresno, Placer, Santa Barbara, and Tulare counties. The total shipments for 1937 were the largest since 1919. The 1936 output amounted to 221 tons worth \$3,314.

Occurrence.

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In 1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as peridotite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

Imports.

Imports of foreign chromite¹ to the United States duty free during 1937, came mainly from Southern Rhodesia, Union of South Africa, New Caledonia, Philippine Islands, Turkey, Greece, and India. The total was 553,916 long tons, valued at \$7,324,488 for 1937, compared with 324,258 long tons worth \$4,431,898 for 1936.

Total Chromite Production of California.

Production of chromite in California began, apparently, about 1874, principally in San Luis Obispo County. There was considerable activity from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons), valued at \$329,924, was shipped from that county up to the beginning of 1887. Some ore also was shipped from the Tyson properties in Del Norte County. The tabulation herewith shows the output of chromite in California, annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1874-1887 (San Luis Obispo County)-----	26,028	\$329,924	1912-----	1,270	\$11,260
1887-----	3,000	40,000	1913-----	1,180	12,700
1888-----	1,500	20,000	1914-----	1,517	9,434
1889-----	2,000	30,000	1915-----	3,725	38,044
1890-----	3,599	53,985	1916-----	48,943	717,244
1891-----	1,372	20,580	1917-----	52,379	1,130,298
1892-----	1,500	22,500	1918-----	73,955	3,649,497
1893-----	3,319	49,785	1919-----	*4,314	97,164
1894-----	3,680	39,980	1920-----	1,770	43,031
1895-----	1,740	16,795	1921-----	347	6,870
1896-----	786	7,775	1922-----	379	6,334
1897-----			1923-----	84	1,658
1898-----			1924-----	350	6,700
1899-----			1925-----	191	3,712
1900-----	140	1,400	1926-----	393	7,063
1901-----	130	1,950	1927-----	225	5,063
1902-----	315	4,725	1928-----	729	15,179
1903-----	150	2,250	1929-----	327	5,025
1904-----	123	1,845	1930-----	84	1,905
1905-----	40	600	1931-----	441	6,737
1906-----	317	2,859	1932}-----	1,206	16,587
1907-----	302	6,040	1933}-----		
1908-----	350	6,195	1934-----	294	3,498
1909-----	436	5,309	1935-----	488	6,111
1910-----	749	9,707	1936-----	221	3,314
1911-----	935	14,197	1937-----	1,918	20,830
			Totals-----	249,243	\$6,514,209

* Recalculated to 45% Cr₂O₃ beginning with 1919.

* Included under 'Unapportioned.'

¹ U. S. Bureau of Mines Mineral Market Report M. M. S. 635, March 29, 1938.

COBALT

Bibliography: Report XIV, XXXIII. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I. C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt (May 26, 1938) is around 97 to 99% at \$1.92 per pound for the refined metal.

COPPER

Bibliography: State Mineralogist Reports VIII-XXXIV (inc.). Bulletins 23, 50, 91.

The output of copper in California during 1937 amounted to a total of 10,512,500 pounds recoverable metal valued at \$1,272,013. This was an increased amount and value over the 1936 production which was 9,991,799 pounds worth \$919,245. The average price of copper in 1937 was 12.1¢ per pound compared with 9.2¢ in 1936; 8.3¢ in 1935; 8.0¢ in 1934; 6.4¢ in 1933; and 6.3¢ in 1932.

Copper was second to gold among the metals in California from 1896 to 1932, when it was passed in output by quicksilver and silver, and in 1933 also by tungsten, and in 1936 and 1937 by silver only.

Distribution of the 1937 output of copper in California by counties was as follows:

County	Pounds	Value
Alpine.....	827	\$100
Amador.....	18,579	2,248
Butte.....	2,545	308
Calaveras.....	9,703	1,174
El Dorado.....	65,353	7,908
Imperial.....	118,138	14,295
Inyo.....	71,080	8,601
Kern.....	5,504	666
Madera.....	2,007	243
Mariposa.....	11,927	1,443
Mono.....	13,216	1,599
Napa.....	1,156	140
Nevada.....	178,643	21,616
Placer.....	5,959	721
Plumas.....	9,879,959	1,195,475
San Bernardino.....	28,760	3,480
Shasta.....	88,985	10,767
Sierra.....	1,213	146
Siskiyou.....	1,186	144
Tuolumne.....	6,157	745
Fresno, Los Angeles, and Riverside*	1,612	194
Totals.....	10,512,500	\$1,272,013

*Combined to conceal the output of individual producers in each.

According to preliminary data issued by the U. S. Bureau of Mines¹ the smelter production of primary copper from domestic sources during 1937 amounted to 1,669,322,278 pounds, an increase of approximately 37 per cent compared with the 1936 output. The value increased approximately 80 per cent in 1937. The average price of

¹ U. S. Bureau of Mines, Mineral Market Report 667, June 22, 1938.

copper delivered during the year, as reported to the U. S. Bureau of Mines by selling agents, was 12.1¢ per pound.

Copper Production of California, by Years.

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus'¹ had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

Copper Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1882.....	826,695	\$144,672	1910.....	53,721,032	\$6,680,641
1883.....	1,600,862	265,743	1911.....	36,838,024	4,604,753
1884.....	876,166	120,911	1912.....	34,169,997	5,638,049
1885.....	469,028	49,248	1913.....	34,471,118	5,343,023
1886.....	430,210	43,021	1914.....	30,491,535	4,055,375
1887.....	1,600,000	192,000	1915.....	40,968,966	7,169,567
1888.....	1,570,021	235,303	1916.....	55,809,019	13,729,017
1889.....	151,505	18,180	1917.....	48,534,611	13,249,948
1890.....	23,347	3,502	1918.....	47,793,046	11,805,883
1891.....	3,397,405	424,675	1919.....	22,162,605	4,122,246
1892.....	2,980,944	342,808	1920.....	12,947,299	2,382,303
1893.....	239,682	21,571	1921.....	12,088,053	1,559,358
1894.....	738,594	72,486	1922.....	22,883,987	3,090,582
1895.....	225,650	21,901	1923.....	28,346,860	4,166,989
1896.....	1,992,844	199,599	1924.....	52,089,349	6,823,704
1897.....	13,638,626	1,540,666	1925.....	46,968,499	6,669,527
1898.....	21,543,229	2,475,168	1926.....	33,521,544	4,693,014
1899.....	23,915,486	3,990,534	1927.....	27,350,316	3,582,888
1900.....	29,515,512	4,748,242	1928.....	25,162,304	3,623,360
1901.....	34,931,788	5,501,782	1929.....	33,809,258	5,941,799
1902.....	27,860,162	3,239,975	1930.....	26,534,752	3,449,522
1903.....	19,113,861	2,520,997	1931.....	12,954,842	1,178,890
1904.....	29,974,154	3,969,995	1932.....	1,417,536	89,307
1905.....	16,997,489	2,650,605	1933.....	992,515	63,521
1906.....	28,726,448	5,522,712	1934.....	590,638	47,252
1907.....	32,602,945	6,341,387	1935.....	2,031,836	168,645
1908.....	40,868,772	5,350,777	1936.....	9,991,799	919,245
1909.....	65,727,736	8,478,142	1937.....	10,512,500	1,272,013
Totals.....				1,167,592,001	\$184,606,943

GOLD

Bibliography: State Mineralogist Reports I to XXXIV (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95, 108. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of

¹ Browne, J. Ross, Mineral Resources West of the Rocky Mountains, p. 168, 1867.

years in annual value by petroleum, and by natural gas from 1923 to 1932, it still heads our metal list, and California continues to outrank all the other gold-producing States of the United States, including Alaska. In fact, at present, California is producing approximately 24% of the gold mined in the entire United States.

There has been a steady increase in the development of both lode and placer mines in California during the last nine years, brought about by the present economic conditions. During 1937 there were 1751 operators in California, not including snipers, prospectors and various individuals, selling gold in small lots to the bullion dealers. There was no premium paid on gold during 1932, the price being \$20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer which corresponded to the world price, all of which had an effect on the 1933 gold yield. On January 30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became \$35 a fine ounce. The average weighted value of gold per fine ounce in 1934 was \$34.95.

The production of gold in California during 1937 totaled 1,174,578 fine ounces valued at \$41,110,230, being an increase of 97,136 fine ounces over the 1936 yield. Deep or lode mines accounted for 702,272 fine ounces worth \$24,579,520, and placers (mainly bucket-line, drag-line and power-shovel dredges) produced 472,306 fine ounces worth \$16,530,710.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of Charles White Merrill and H. M. Gaylord of the Division of Mineral Statistics, U. S. Bureau of Mines.

The largest production in 1937 was reported from Nevada County with an output of 308,720 fine ounces (\$10,805,200); Amador County second with 106,081 fine ounces (\$3,712,835); Sacramento County third with 102,879 fine ounces (\$3,600,765); Yuba County fourth with 71,289 fine ounces (\$2,495,115); Kern County fifth with 70,431 fine ounces (\$2,465,085); followed in turn by Merced, Shasta, Calaveras, El Dorado, Placer, Butte, Siskiyou, and Mariposa counties, each with a total output worth in excess of a million dollars.

Nevada held the first place as a gold producing county with an output exceedingly that of Yuba or Amador which held first and second places respectively in 1928 with Sacramento fourth that year. Amador being in second place exceeded Sacramento County which held that place from 1931 to 1936. Sacramento was in third place. The gold from Yuba and Sacramento comes almost entirely from dredges, while that from Nevada and Amador counties comes mainly from the lode mines.

Distribution of the 1937 gold output by counties was as follows:

County	Number of operators ^a		Value
	Lode	Placer	
Alpine.....	2		\$13,790
Amador.....	46	23	3,712,835
Butte.....	13	53	1,558,305
Calaveras.....	55	59	1,730,435
Del Norte.....		4	2,625
El Dorado.....	47	58	1,719,795
Fresno.....	4	3	8,540
Humboldt.....	2	15	27,230
Imperial.....	12	6	298,095
Inyo.....	83	10	620,585
Kern.....	125	10	2,465,085
Lassen.....	4		21,175
Los Angeles.....	17	6	140,070
Madera.....	15	13	13,615
Mariposa.....	80	28	1,025,010
Merced.....		4	1,858,815
Modoc.....	1		210
Mono.....	15		182,105
Monterey.....	2		1,960
Napa.....	1		12,355
Nevada.....	33	46	10,805,200
Placer.....	42	98	1,594,320
Plumas.....	18	57	911,610
Riverside.....	31	6	215,040
Sacramento.....		19	3,600,765
San Bernardino.....	97	13	218,925
San Diego.....	5		2,100
San Joaquin.....		4	79,765
San Luis Obispo.....	1	2	9,625
Shasta.....	19	28	1,773,275
Sierra.....	15	51	934,570
Siskiyou.....	31	98	1,055,600
Stanislaus.....		3	603,645
Trinity.....	22	60	703,780
Tulare.....	4	2	1,050
Tuolumne.....	62	37	690,585
Ventura.....	3		1,295
Yolo.....		1	1,330
Yuba.....	6	21	2,495,115
Totals.....	913	838	\$41,110,230

^a Number does not include snipers, prospectors, and various individuals selling small lots to bullion dealers.

The following is quoted from the advance statement of gold in 1937 by courtesy of the U. S. Bureau of Mines,* Department of Commerce:

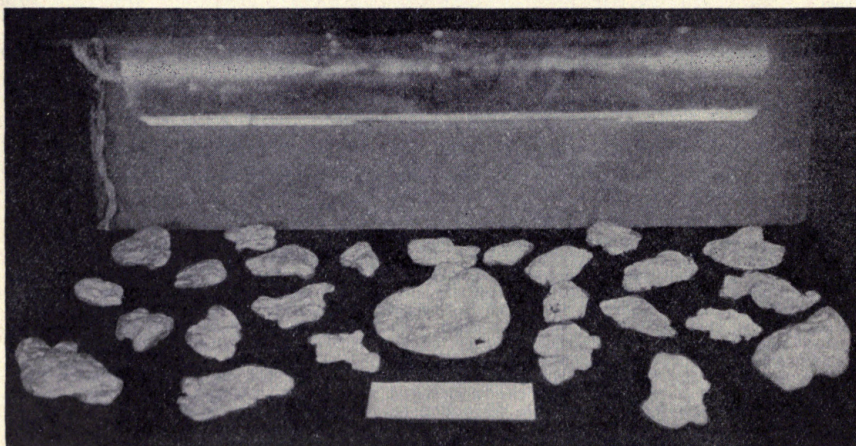
"Gold.—The mine production of gold in California continued its upward climb from a low point of \$8,526,703 in 1929 to \$41,110,230 in 1937, an increase of 382 per cent over the 9-year period. In value the 1937 output exceeded that in any year since 1861 and in quantity that in any year since 1883. Although the data for gold production before 1901 do not segregate placer or lode gold, it appears certain that the production of lode gold was larger in 1937 in both quantity and value than in any year in the history of the State. The quantity and value of placer gold produced are known to be higher in 1937 than in any year since 1900. Moreover, it seems probable that the placer miners have not enjoyed so good a year since unrestricted hydraulic mining flourished over 50 years ago. The 25 leading mines listed in the following table produced 60 per cent of the State total."

* U. S. Bureau of Mines, Mineral Year Book, 1938, p. 208.

Twenty-five Leading Gold Producers in California in 1937, in Approximate Order of Output

Mine	District	County	Operator	Source of gold
Empire Star Mines	Grass Valley-Nevada City	Nevada	Empire Star Mines Co., Ltd.	Gold ore
Idaho Maryland	Grass Valley-Nevada City	Nevada	Idaho Maryland Mines Corp.	Gold ore
Yuba Unit	Yuba River	Yuba	Yuba Consolidated Gold Fields	Dredge
Natomas Co.	Folsom	Sacramento	Natomas Co.	Dredge
Lava Cap	Grass Valley-Nevada City	Nevada	Lava Gold Mining Corporation	Gold ore
Capital Dredge	Folsom	Sacramento	Capital Dredging Co.	Dredge
Golden Queen	Mojave	Kern	Golden Queen Mining Co.	Gold ore
Carson Hill	Mother Lode	Calaveras	Carson Hill Gold Mining Corp.	Gold ore
Merced Unit	Snelling	Merced	Yuba Consolidated Gold Fields	Dredge
Argonaut	Mother Lode	Amador	Argonaut Mining Co., Ltd.	Gold ore
Snelling Unit	Snelling	Merced	Snelling Gold Dredging Co.	Dredge
Central Eureka and Old Eureka	Mother Lode	Amador	Central Eureka Mining Co.	Gold ore
La Grange Dredge No. 4	La Grange	Stanislaus	La Grange Gold Dredging Co.	Dredge
Big Canyon	West Belt	El Dorado	Mountain Copper Co., Ltd.	Gold ore
Walker	Genesee	Plumas	Walker Mining Co.	Copper ore
Cardinal	Chidago	Inyo	Cardinal Gold Mining Co.	Gold ore
Kennedy	Mother Lode	Amador	Kennedy Mining & Milling Co.	Gold ore
Arroyo Seco	Mother Lode	Amador	Arroyo Seco Gold Dredging Co.	Dredge
Sixteen to One	Alleghany	Sierra	Original Sixteen to One Mine, Inc.	Gold ore
Callahan Unit	Callahan	Siskiyou	Yuba Consolidated Gold Fields	Dredge
Yellow Aster	Randsburg	Kern	Anglo American Mining Corporation, Ltd.	Gold ore
Cosumnes Dredge	Cosumnes River	Sacramento	Cosumnes Gold Dredging Co.	Dredge
Starlight	Mojave	Kern	Lodestar Mining Co.	Gold-silver
Golden Center	Grass Valley-Nevada City	Nevada	Cooley Butler	Gold ore
Loomis Dredge	Ophir	Placer	Gold Hill Dredging Co.	Dredge

"It will be noted that the mines occupying the first, second, and fifth place are all in the Grass Valley-Nevada City district. The list includes ten operators using connected-bucket dredges; no dragline dredge operation was large enough to qualify among the 25 leading gold producers of the State."

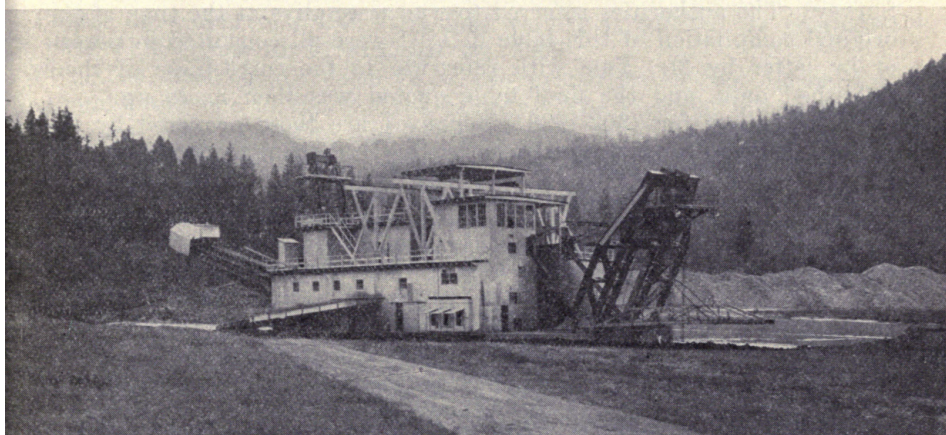


Gold Nuggets, value \$7,000, from an ancient channel gravel mine, Sierra County. Mined in 1938, and displayed at State Fair.

Photo by Walter W. Bradley

Total Gold Production of California.

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,¹ and possibly 1820.² On March 2, 1844, Don Manuel Castanares, deputy for California to the Congress of Mexico, reported³ to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.



Dredge of Junction City Mining Co.; Junction City, Trinity County.

Photo by Chas. V. Averill

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver"

¹ Hittell, T. H., *History of California*, Vol. II, p. 12, 1885.

² Bancroft, H. H., *History of California*, Vol. II, p. 417, 1886.

³ *Mercantile Trust Review of the Pacific*, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.

(1867). U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

Total Gold Production of California

Year	Value	Year	Value
1848.....	\$245,301	1894.....	\$13,863,282
1849.....	10,151,360	1895.....	15,334,317
1850.....	41,273,106	1896.....	17,181,562
1851.....	75,938,232	1897.....	15,871,401
1852.....	81,294,700	1898.....	15,906,478
1853.....	67,613,487	1899.....	15,336,031
1854.....	69,433,931	1900.....	15,863,355
1855.....	55,485,395	1901.....	16,989,044
1856.....	57,509,411	1902.....	16,910,320
1857.....	43,628,172	1903.....	16,300,653
1858.....	46,591,140	1904.....	18,633,676
1859.....	45,846,599	1905.....	18,898,545
1860.....	44,095,163	1906.....	18,732,452
1861.....	41,884,995	1907.....	16,727,928
1862.....	38,854,668	1908.....	18,761,559
1863.....	23,501,736	1909.....	20,237,870
1864.....	24,071,423	1910.....	19,715,440
1865.....	17,930,858	1911.....	19,738,908
1866.....	17,123,867	1912.....	19,713,478
1867.....	18,265,452	1913.....	20,406,958
1868.....	17,555,867	1914.....	20,653,496
1869.....	18,229,044	1915.....	22,442,296
1870.....	17,458,133	1916.....	21,410,741
1871.....	17,477,885	1917.....	20,087,504
1872.....	15,482,194	1918.....	16,528,953
1873.....	15,019,210	1919.....	16,695,955
1874.....	17,264,836	1920.....	14,311,043
1875.....	16,876,009	1921.....	15,704,822
1876.....	15,610,723	1922.....	14,670,346
1877.....	16,501,268	1923.....	13,379,013
1878.....	18,839,141	1924.....	13,150,175
1879.....	19,626,654	1925.....	13,065,330
1880.....	20,030,761	1926.....	11,923,481
1881.....	19,223,155	1927.....	11,671,018
1882.....	17,146,416	1928.....	10,785,315
1883.....	24,316,873	1929.....	8,526,703
1884.....	13,600,000	1930.....	9,451,162
1885.....	12,661,044	1931.....	10,814,162
1886.....	14,716,506	1932.....	11,765,726
1887.....	13,588,614	1933.....	^a 15,683,075
1888.....	12,750,000	1934.....	^b 25,131,284
1889.....	11,212,913	1935.....	^c 31,165,050
1890.....	12,309,793	1936.....	37,710,470
1891.....	12,728,869	1937.....	41,110,230
1892.....	12,571,900		
1893.....	12,538,780	Total value.....	\$2,015,036,191

^a Value calculated at an average weighted price of \$25.56 per fine ounce; previously \$20.6718.

^b Value calculated at an average weighted price of \$34.95 per fine ounce.

^c Value \$35 per fine ounce, beginning 1935.

IRIDIUM (see under Platinum)

IRON ORE

Bibliography: State Mineralogist Reports II, IV, V, X, XII-XV (inc.), XVII, XVIII, XXI-XXVII (inc.), XXX, XXXI, XXXIII. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117-122; Vol. 123, pp. 94-96, 113-114.

During 1937 shipments of iron ore were made in California coming from two properties each in Inyo and San Bernardino counties. These amounted to 5,490 short tons valued at \$29,340, as compared with 31,084 tons worth \$155,434 for 1936.

The 1936 output came from two properties in San Bernardino County and one in Santa Cruz County. The material mined during the year was magnetite and hematite from Inyo County, and hematite from San Bernardino County. The hematite was used mostly in high-iron cement with some going to foundries as a flux. Use of magnetite is not known.

There was also some high-grade limonite mined in Yuba County, but as it was used in the manufacture of pigments, it has been classed under Mineral Paints.

There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Riverside, San Bernardino, and Los Angeles counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron has been made, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

Iron Ore Production in California, by Years.

Total iron ore production of California, with annual amounts and values, is as follows:

Year	Tons	Value	Year	Tons	Value
1881*	9,273	\$79,452	1917	2,874	\$11,496
1882	2,073	17,766	1918	3,108	15,947
1883	11,191	106,540	1919	2,300	13,796
1884	4,532	40,983	1920	5,975	40,889
1885			1921	1,970	12,030
1886	3,676	19,250	1922	3,588	18,868
1887			1923	3,102	18,665
1893	250	2,000	1924		
1894	200	1,500	1925	785	4,710
1895			1926		
1907	400	400	1927	5,272	26,000
1908			1928		
1909	108	174	1930		
1910	579	900	1931	100	700
1911	558	558	1932		
1912	2,508	2,508	1934		
1913	2,343	4,485	1935	38,339	163,714
1914	1,436	5,128	1936	31,084	155,434
1915	724	2,584	1937	5,490	29,340
1916	3,000	6,000	Totals	146,718	\$901,817

* Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hotelling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

* Annual details concealed under 'Unapportioned.'

LEAD

Bibliography: State Mineralogist Reports IV, VIII-XV (inc.), XVII-XXVIII (inc.), XXX, XXXI, XXXIII, XXXIV.

The production of lead in California during 1937 amounted to a total of 2,402,110 pounds of recoverable metal valued at \$141,724 compared with the 1936 figures of 1,098,545 pounds worth \$50,533. The average price of lead in 1937 was 5.9¢ per pound compared with 4.6¢ per pound in 1936, 4.0¢ per pound in 1935, 3.7¢ per pound in 1934, 3.7¢ per pound in 1933, and 3.0¢ per pound in 1932.

Distribution of the 1937 output of lead by counties was as follows:

County	Pounds	Value
Alpine.....	6,992	\$413
Amador.....	7,004	413
Calaveras.....	1,816	107
El Dorado.....	6,011	355
Imperial.....	8,210	484
Inyo.....	1,908,280	112,589
Kern.....	2,923	172
Los Angeles.....	7,046	416
Mono.....	12,938	763
Nevada.....	316,006	18,644
Placer.....	10,432	615
Riverside.....	4,028	238
San Bernardino.....	106,211	6,266
Butte, Mariposa, Plumas, Shasta, Sierra, Siskiyou, Tuolumne, and Yuba*	4,213	249
Totals.....	2,402,110	\$141,724

*Combined to conceal the output of individual operators in each.

Lead Production of the United States.

According to preliminary data issued by the U. S. Bureau of Mines ¹ during 1937 the production of primary lead in the United States was 443,142 short tons, valued at \$52,291,000 being an increase over the national production of 1936 which was 387,698 short tons worth \$35,668,000.

¹ U. S. Bureau of Mines, Mineral Market Notes 652, May 6, 1938.

Lead Production of California, by Years.

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

Lead Production of California, by Years.

Year	Pounds	Value	Year	Pounds	Value
1877	*7,836,000	\$391,800	1908	1,124,483	\$46,663
1878	8,640,000	328,320	1909	2,685,477	144,897
1879	4,502,000	191,335	1910	3,016,902	134,082
1880	4,200,000	215,460	1911	1,403,839	63,173
1881	6,680,000	325,316	1912	1,370,067	61,653
1882	b4,000,000	196,800	1913	3,640,951	160,202
1883	c3,400,000	145,520	1914	4,697,400	183,198
1884	3,200,000	120,512	1915	4,796,299	225,426
1885	2,000,000	80,900	1916	12,392,031	855,049
1886	2,000,000	93,400	1917	21,651,352	1,862,016
1887	d1,160,000	52,200	1918	13,464,869	956,006
1888	900,000	38,250	1919	4,139,562	219,397
1889	940,000	35,720	1920	4,903,738	392,300
1890	800,000	36,000	1921	1,149,051	51,707
1891	1,140,000	49,020	1922	6,511,280	358,120
1892	1,360,000	54,400	1923	9,934,522	695,416
1893	666,000	24,975	1924	4,984,387	398,751
1894	950,000	28,500	1925	7,352,422	639,661
1895	1,592,400	49,364	1926	8,067,873	645,429
1896	1,293,500	38,805	1927	2,748,440	173,151
1897	596,000	20,264	1928	1,882,795	109,102
1898	655,000	23,907	1929	1,428,777	90,014
1899	721,000	30,642	1930	3,542,796	176,241
1900	1,040,000	41,600	1931	3,934,240	145,568
1901	720,500	28,820	1932	2,418,626	72,480
1902	349,440	12,230	1933	772,463	28,583
1903	110,000	3,960	1934	804,911	29,655
1904	124,000	5,270	1935	1,142,405	45,695
1905	538,680	25,083	1936	1,098,545	50,533
1906	338,718	19,307	1937	2,402,110	141,724
1907	328,681	16,690			
			Totals	202,239,532	\$11,780,262

* Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.

^b Estimated.

^c Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.

^d Data from 1887 to date from reports of California State Mining Bureau.

MANGANESE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVIII, XXII-XXVII (inc.), XXIX-XXXI, XXXIII. Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour.-Press, Vol. 117, p. 545.

During 1937 there were no shipments of manganese ore reported in California. The material mined in 1935 came from a single property in Riverside County and was consumed in the steel mills of the State. The annual details are concealed under the 'Unapportioned' item as one operator made all the shipments.

Imports of foreign manganese ore into the United States¹ during 1937, mainly from Soviet Russia, Gold Coast, Cuba, and Brazil, amounted to 974,281 long tons of ore containing 464,638 tons of manganese valued at \$10,710,807, as compared with 846,648 long tons containing 415,749 long tons of manganese worth \$8,819,600.

¹ U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary, Dec., 1937.

The Tariff Act of 1930 provides for an import duty of 1¢ per pound on the metallic manganese contained, for "manganese ore (including ferruginous manganese ore) or concentrates containing in excess of 10 per centum of metallic manganese."

Manganese Ore Production in California, by Years.

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's output of manganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1887	1,000	\$9,000	1912	22	\$400
1888	1,500	13,500	1913		
1889	53	901	1914	150	1,500
1890	386	3,176	1915	4,013	49,098
1891	705	3,830	1916	13,404	274,601
1892	300	3,000	1917	15,515	396,659
1893	270	4,050	1918	26,075	979,235
1894	523	5,512	1919	11,569	451,422
1895	880	8,200	1920	2,892	62,323
1896	518	3,415	1921	1,005	12,210
1897	504	4,080	1922	540	7,650
1898	440	2,102	1923	690	10,620
1899	295	3,165	1924	1,115	25,785
1900	131	1,310	1925	832	19,450
1901	425	4,405	1926	235	4,700
1902	870	7,140	1927		
1903	1	25	1928		
1904	60	900	1929	733	8,216
1905			1930		
1906	1	30	1931	207	2,576
1907	1	25	1932		
1908	321	5,785	1934		
1909	3	75	1935	432	4,630
1910	265	4,235	1936		
1911	2	40			
			Totals	88,883	\$2,398,976

*Annual details concealed under 'Unapportioned.'

MOLYBDENUM

Bibliography: State Mineralogist Reports XIV, XVII-XXIV (inc.), XXVI-XXVIII (inc.), XXX. Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese, nickel, tungsten and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wulfenite, lead molybdate; the former furnishing practically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses

associated with copper sulphides. The first recorded commercial shipments of molybdenum ore in California were during the war, 1916-1918. Some development work has been done on a high-grade deposit at the head of the Kaweah River, Tulare County.

The Tariff Act of 1930 provides for an import duty of 35 cents a pound for the metallic molybdenum content of molybdenum ores or concentrates.

The present (May 26, 1938) quotations on molybdenum ores are 45¢ per pound of MoS_2 contained, delivered at Pittsburgh, Pa., and on ferromolybdenum are 95¢ per pound Mo, 55%-65% Mo f.o.b. shipping point.

During 1937 there was no production of molybdenum ore reported mined in California. In 1933 and 1934 there were shipments of molybdenum concentrates in California amounting to 1432 pounds 91.23% MoS_2 valued at \$306. The annual details are combined under the 'Unapportioned' item to conceal the output of either operator.

Molybdenum Production of California, by Years.

California's production of molybdenum ore by years is summarized in the following tabulation:

Year	Tons	Value
1916.....	8	\$9,945
1917.....	243	9,014
1918.....	*	300
1919.....		
1933.....		
1934/ ^a	b	306
Totals.....	252	\$19,565

* 300 pounds of 90% MoS_2 concentrate.

^a Annual details concealed under 'Unapportioned.'

^b 1432 pounds of 91.23% MoS_2 concentrates.

NICKEL

Bibliography: State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII, XXX. U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present (June 16, 1938) quotations for nickel are around 35¢ per pound for the refined metal.

OSMIUM (see under Platinum)

PALLADIUM (see under Platinum)

PLATINUM GROUP METALS

Bibliography: State Mineralogist Reports IV, VIII, IX, XII-XXVI (inc.), XXVIII, XXX, XXXI. Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217-218.

In California the platinum-group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Merced, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties, with a small amount coming from the hydraulic and surface sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

Platinum-group metals mined during 1937 amounted to 977.88 ounces crude, of which 578.54 ounces crude was shipped and sold, containing 530.29 fine ounces worth \$23,704. This metal came from properties in Amador, Butte, Calaveras, El Dorado, Merced, Humboldt, Nevada, Placer, Sacramento, Shasta, Trinity, and Yuba counties. Of the above sold in 1937, 216.46 fine ounces was platinum; 75.98 fine ounces was iridium; 44.31 fine ounces was osmium; 172.10 fine ounces was osiridium and 21.44 fine ounces was a mixture of ruthenium, palladium, and rhodium. The 1926 output was 1,134 ounces crude containing 1,000.02 fine ounces worth \$40,669.

Present quotations¹ (June 16, 1938) are platinum \$33 a fine ounce; iridium 99 per cent plus \$90 to \$100; osmium per fine ounce \$48 to \$50; palladium per fine ounce \$24; ruthenium per fine ounce \$35 to \$40; rhodium per fine ounce \$120 to \$125.

Platinum Production of California, by Years.

The annual production and values since 1887 have been as follows:

Year	Ounces	Value	Year	Ounces	Value
1887	416	\$10,400	1913	368	\$17,738
1888	100	400	1914	463	14,816
1889	500	2,000	1915	667	21,140
1890	500	2,000	1916	886	42,642
1891	600	2,500	1917	610	43,719
1892	100	500	1918	571	42,788
1893	80	440	1919	*418	60,611
1894	75	517	1920	477	68,977
1895	100	600	1921	613	58,754
1896	150	900	1922	795	90,288
1897	162	944	1923	602	78,546
1898	150	900	1924	273	36,452
1899	300	1,800	1925	292	39,937
1900	300	1,800	1926	322	32,005
1901	400	2,500	1927	139	10,749
1902	250	3,200	1928	312	27,902
1903	39	468	1929	212	14,416
1904	70	1,052	1930	217	11,700
1905	123	1,849	1931	305	11,979
1906	200	3,320	1932	278	8,142
1907	91	1,647	1933	236	7,255
1908	300	6,255	1934	424	14,884
1909	706	13,414	1935	121	4,153
1910	337	8,386	1936	1,000	40,669
1911	511	14,873	1937	530	23,704
1912	603	19,731			
			Totals	18,288	\$926,371

* Fine ounces, beginning with 1919.

¹ E & M J Metal and Mineral Markets, June 16, 1938.

QUICKSILVER

Bibliography: State Mineralogist Reports IV, V, XII-XV, XVII-XXIX (inc.), XXXI, XXXIII. Bulletin 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines, Tech. Papers 96, 227; Bulletin 222, 335.

The production of quicksilver in California during the year 1937 was 9,995 flasks valued at \$837,789, compared with the 1936 output of 8,758 flasks worth \$671,055. Distribution of the 1937 output was as follows:

County	Flasks	Value
Lake.....	4,012	\$341,444
Napa.....	329	26,051
San Benito.....	1,756	146,524
San Luis Obispo.....	2,133	179,731
Santa Barbara.....	654	51,140
Santa Clara.....	257	21,035
Sonoma.....	281	22,085
Colusa, Contra Costa, Fresno, Inyo, Kern, Kings, Monterey, Siskiyou, Solano, Trinity, Yolo*	573	49,779
Totals.....	9,995	\$837,789

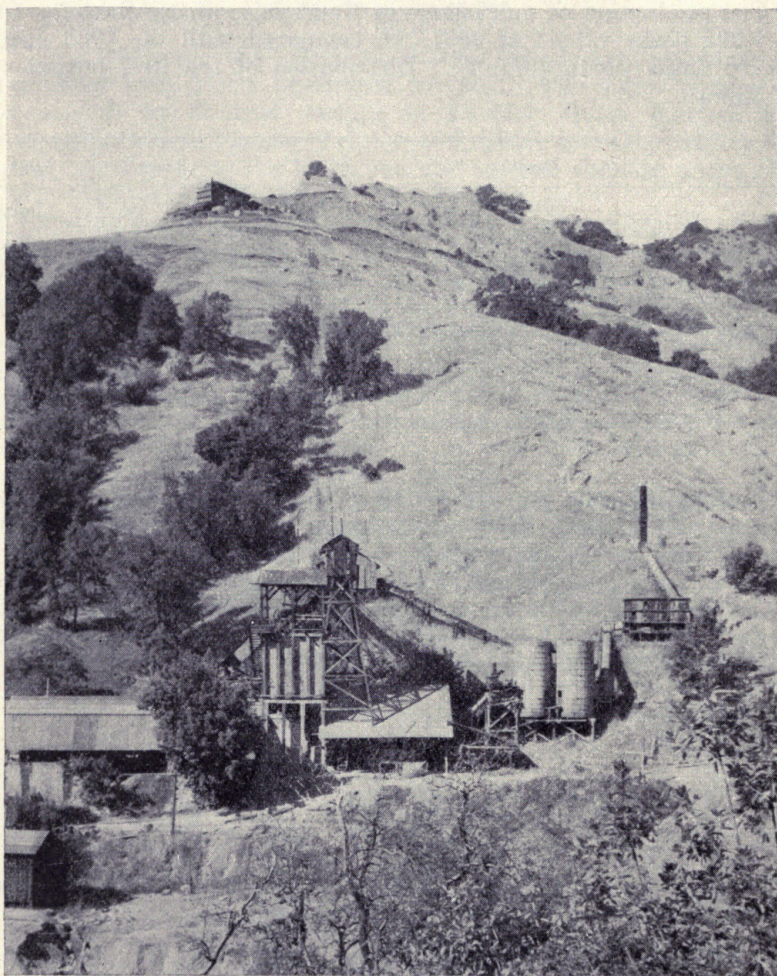
* Combined to conceal the output of individual operators.

Prices.

During 1937 the average for New York monthly quotations¹ was \$90.18 per 76-lb. flask. The average price for 1936 was \$79.917. The average price for January, 1936, was \$90.25, raising to a peak in June with an average of \$96.654 for the month then declining to the end of the year, with an average for December of \$90.25. The average price received by producers in California during 1937 was \$83.82 per 76-lb. flask, compared with \$76.62 per flask in 1936.

¹ U. S. Bureau of Mines, Mineral Report 661, May 21, 1938.

The U. S. Bureau of Mines¹ reported the total production of the United States for 1937 at 16,508 flasks valued at \$1,488,691. The national production for 1936 was 16,569 flasks worth \$1,324,194. California was by a considerable margin the largest producing state, with approximately 59 per cent of the total, other producing states being



Cloverdale Quicksilver Mine, Sonoma County. New concentrating plant above, old furnace plant below.

Photo by Walter W. Bradley

Oregon, Texas, Arkansas, Washington, Nevada, and Arizona. The 1937 imports of quicksilver amounted to 18,917 flasks valued at \$1,341,928 compared with 18,088 flasks valued at \$1,017,817 in 1936, an increase of 5 per cent. Of total imports for 1937, Spain supplied 7,042 flasks, Italy 9,832 flasks, United Kingdom 510 flasks, and Mexico 1,533 flasks.

¹ U. S. Bureau of Mines, Mineral Report 661, May 21, 1938.

Total Quicksilver Production of California.

Total amount and value of the quicksilver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and was in practically continuous operation from 1846 to 1921 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained 76½ pounds; then 75 pounds up to and including 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850-1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883-1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

Year	Flasks	Value	Average price per flask	Year	Flasks	Value	Average price per flask
1850.....	7,723	\$768,052	\$99 45	1895.....	36,104	\$1,337,131	\$37 04
1851.....	27,779	1,859,248	66 93	1896.....	30,765	1,075,449	34 96
1852.....	20,000	1,166,600	58 33	1897.....	26,691	993,445	37 28
1853.....	22,284	1,235,648	55 45	1898.....	31,092	1,188,626	38 23
1854.....	30,004	1,663,722	55 45	1899.....	29,454	1,405,045	47 70
1855.....	33,000	1,767,150	53 55	1900.....	26,317	1,182,786	44 94
1856.....	30,000	1,549,500	51 65	1901.....	26,720	1,285,014	48 46
1857.....	28,204	1,374,381	48 73	1902.....	29,552	1,276,524	43 20
1858.....	31,000	1,482,730	47 83	1903.....	32,094	1,335,954	42 25
1859.....	13,000	820,690	63 13	1904.....	*28,876	1,086,323	37 62
1860.....	10,000	535,500	53 55	1905.....	24,555	886,081	35 94
1861.....	35,000	1,471,750	42 05	1906.....	19,516	712,334	36 50
1862.....	42,000	1,526,700	36 35	1907.....	17,379	663,178	38 16
1863.....	40,531	1,705,544	42 08	1908.....	18,039	763,520	42 33
1864.....	47,489	2,179,745	45 90	1909.....	16,217	773,758	47 71
1865.....	53,000	2,432,700	45 90	1910.....	17,665	799,002	45 23
1866.....	46,550	2,473,202	53 13	1911.....	19,109	879,205	46 01
1867.....	47,000	2,157,300	45 90	1912.....	20,600	866,024	42 04
1868.....	47,728	2,190,715	45 90	1913.....	15,661	630,042	40 23
1869.....	33,811	1,551,925	45 90	1914.....	11,373	557,846	49 05
1870.....	30,077	1,725,818	57 38	1915.....	14,199	1,157,449	81 52
1871.....	31,686	1,999,387	63 10	1916.....	21,427	2,003,425	93 50
1872.....	31,621	2,084,773	65 93	1917.....	24,382	2,396,466	98 29
1873.....	27,642	2,220,482	80 33	1918.....	22,621	2,579,472	114 03
1874.....	27,756	2,919,376	105 18	1919.....	15,200	1,353,381	89 04
1875.....	50,250	4,228,538	84 15	1920.....	10,278	775,527	75 45
1876.....	75,074	3,303,256	44 00	1921.....	3,157	140,666	44 56
1877.....	79,396	2,961,471	37 30	1922.....	3,466	191,851	55 35
1878.....	63,880	2,101,652	32 90	1923.....	5,458	332,851	60 98
1879.....	73,684	2,194,674	29 85	1924.....	7,948	543,080	68 33
1880.....	59,926	1,857,706	31 00	1925.....	7,683	621,831	80 81
1881.....	60,851	1,815,185	29 83	1926.....	5,892	516,382	87 64
1882.....	52,732	1,488,624	28 23	1927.....	6,488	714,418	111 67
1883.....	46,725	1,343,344	28 75	1928.....	b, 107	844,649	118 84
1884.....	31,913	973,347	30 50	1929.....	10,152	1,195,705	117 78
1885.....	32,073	986,245	30 75	1930.....	11,374	1,255,257	110 36
1886.....	29,981	1,064,326	35 50	1931.....	13,478	1,121,624	83 22
1887.....	33,760	1,430,749	42 38	1932.....	5,349	279,780	52 30
1888.....	33,250	1,413,125	42 50	1933.....	4,102	229,472	55 94
1889.....	26,464	1,190,880	45 00	1934.....	7,946	534,135	67 22
1890.....	22,926	1,203,615	52 50	1935.....	9,353	628,590	67 23
1891.....	22,904	1,036,406	45 25	1936.....	8,758	671,055	76 62
1892.....	27,993	1,139,595	40 71	1937.....	9,955	837,789	83 82
1893.....	30,164	1,108,527	36 75				
1894.....	30,416	934,000	30 70	Totals.....	2,392,939	\$117,260,075	-----

* Flasks of 75 lbs. from June, 1904; of 76½ lbs. previously.

b Flasks of 76 pounds, from January, 1928.

SILVER

Bibliography: State Mineralogist Reports IV, VIII, XII-XXXIV inc.). Bulletins 67, 91, 108. Min. & Sci. Press, March 1, 1919.

The 1927 silver output in California totaled 2,888,265 fine ounces valued at \$2,234,073, being an increase in both amount and value over the figures of the previous year which were 2,103,799 fine ounces worth \$1,629,392. Of the 1937 yield, there was 40,481 fine ounces worth \$31,312 from placers. The average price paid for newly mined domestic silver was 77.35¢ per fine ounce in 1936, 71.875¢ in 1935, 64.6¢ in 1934, and 35¢ in 1933.

County	Ounces	Value
Alpine.....	8,950	\$6,923
Amador.....	23,324	18,041
Butte.....	23,728	18,354
Calaveras.....	12,733	9,849
Del Norte.....	10	8
El Dorado.....	10,650	8,238
Fresno.....	55	43
Humboldt.....	122	94
Imperial.....	3,287	2,542
Inyo.....	102,003	78,899
Kern.....	726,197	561,712
Lassen.....	1,465	1,133
Los Angeles.....	2,308	1,785
Madera.....	142	110
Mariposa.....	7,866	6,084
Merced.....	5,525	4,274
Modoc.....	4	3
Mono.....	631,347	488,347
Monterey.....	4	3
Napa.....	66,763	51,641
Nevada.....	506,143	391,502
Placer.....	25,970	20,088
Plumas.....	293,854	227,296
Riverside.....	5,519	4,269
Sacramento.....	4,342	3,359
San Bernardino.....	359,201	277,842
San Diego.....	18	14
San Joaquin.....	162	125
San Luis Obispo.....	19	15
Shasta.....	39,801	30,786
Sierra.....	5,002	3,869
Siskiyou.....	4,421	3,420
Stanislaus.....	1,901	1,470
Trinity.....	2,713	2,099
Tulare.....	12	9
Tuolumne.....	7,957	6,155
Ventura.....	2	2
Yolo.....	5	4
Yuba.....	4,740	3,666
Totals.....	2,888,265	\$2,234,073

The following paragraph is quoted from the U. S. Bureau of Mines,¹ chapter on Gold and Silver from Mineral Year Book 1938, by courtesy of Charles White Merrill and H. M. Gaylord:

"Silver.—The bulk of the silver output in California was more localized than that of gold. The 10 leading producers listed in the following table produced 79 per cent of the State total.

¹U. S. Bureau of Mines, Mineral Year Book 1938, p. 209.

Ten Leading Silver Producers in California in 1937, in Approximate Order of Output

Mine	District	County	Operator	Source of silver
Silverado.....	Mount Patterson.....	Mono.....	Sierra Consolidated Mines, Inc..	Silver ore
Walker.....	Genesee.....	Plumas.....	Walker Mining Co.....	Copper ore
Starlight.....	Mojave.....	Kern.....	Lodestar Mining Co.....	Gold-silver ore
Lava Cap.....	Grass Valley-Nevada City.....	Nevada.....	Lava Cap Gold Mining Corp....	Gold ore
Golden Queen.....	Mojave.....	Kern.....	Golden Queen Mining Co.....	Gold ore
Kelly.....	Randsburg.....	San Bernardino.....	Frank Royer and Barney Stauffer	Silver ore
Cactus Queen.....	Mojave.....	Kern.....	Cactus Mines Co.....	Gold-silver ore
Empire Star.....	Grass Valley-Nevada City.....	Nevada.....	Empire Star Mines Co., Ltd.....	Gold ore
Grigsby (Palisade).....	Calistoga.....	Napa.....	Coast Range Mining Corporation	Silver ore
Spanish.....	Washington.....	Nevada.....	Bradley Mining Co.....	Gold ore

"It will be noted that mines depending on several types of ore produced California's silver output; by-product silver from the Walker copper mine puts it in second place as a silver producer, and four companies that derive the metal as a by-product from gold ore are listed as leading silver producers. In addition to companies listed, some output of silver was reported from almost every lode and placer mine in the State."

Silver Production of California, by Years.

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previous to Bulletin 97 (for 1925), the values shown for 1880-1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880-1896 (inc.) were based on 'coinage value' (\$1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847. From 1905 to date, the figures are those of the U. S. Geological Survey and its successor, the U. S. Bureau of Mines. Figures for the years prior to 1880 are not available, as there were no reliable records compiled.

Silver Production of California, by Years, Since 1880

Year	Fine oz.	Value	Average price per oz.	Year	Fine oz.	Value	Average price per oz.
1880.....	882,169	\$1,014,494	\$1 15	1910.....	1,840,085	\$993,646	\$0 54
1881.....	580,091	655,503	1 13	1911.....	1,270,445	673,336	53
1882.....	653,569	745,069	1 14	1912.....	1,300,136	799,584	615
1883.....	1,129,244	1,253,461	1 11	1913.....	1,378,399	832,553	604
1884.....	3,236,987	3,593,056	1 11	1914.....	1,471,859	813,938	553
1885.....	1,968,260	2,125,298	1 07	1915.....	1,678,756	851,129	507
1886.....	1,245,747	1,233,290	99	1916.....	2,564,354	1,687,345	658
1887.....	1,262,282	1,237,036	98	1917.....	1,775,431	1,462,955	824
1888.....	1,314,874	1,235,982	94	1918.....	1,427,711	1,427,711	1 00
1889.....	823,947	774,510	94	1919.....	1,107,189	1,240,051	1 12
1890.....	820,336	861,353	1 05	1920.....	1,706,327	1,859,896	1 09
1891.....	737,224	729,852	99	1921.....	3,629,223	3,629,223	1 00
1892.....	358,575	311,960	87	1922.....	3,100,065	3,100,065	1 00
1893.....	415,468	324,065	78	1923.....	3,559,443	2,918,743	82
1894.....	229,896	144,834	63	1924.....	3,555,133	2,381,952	67
1895.....	463,911	301,542	65	1925.....	3,054,416	2,119,765	694
1896.....	326,757	222,195	68	1926.....	2,022,460	1,262,015	624
1897.....	754,648	452,789	60	1927.....	1,620,242	918,677	567
1898.....	701,788	414,055	59	1928.....	1,478,711	865,081	585
1899.....	855,869	513,521	60	1929.....	1,176,895	627,285	533
1900.....	1,168,157	724,257	62	1930.....	1,622,803	624,779	385
1901.....	950,831	570,499	60	1931.....	867,818	251,667	290
1902.....	1,163,041	616,412	53	1932.....	493,533	139,176	282
1903.....	958,230	517,444	54	1933.....	402,591	140,907	350
1904.....	1,441,259	835,929	58	1934.....	844,413	545,883	*644
1905.....	1,076,174	650,009	61	1935.....	1,191,112	856,112	*719
1906.....	1,220,641	817,830	68	1936.....	2,103,799	1,629,392	*775
1907.....	1,138,556	751,646	66	1937.....	2,588,265	2,234,073	*774
1908.....	1,647,278	873,057	53				
1909.....	2,098,253	1,091,092	52	Totals.....	83,763,856	\$62,478,989	

*Average price applied to newly mined within the United States.

TIN

Bibliography: Reports XV, XVII, XVIII, XXV, XXXI. Bulletins 67, 91.

In 1928 and 1929 there was a small amount of tin produced from California ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891-1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets having been taken out.

Total Output of Tin in California

Year	Pounds	Value
1891.....	125,289	\$27,564
1892.....	126,000	32,400
1928 ^a		
1929 ^a	1,200	580
Totals.....	252,489	\$60,544

^aAnnual details concealed under 'Unapportioned.'

TITANIUM

Bibliography: State Mineralogist's Report XXIII, XXXIII.

During 1936 there was no production of titanium ores reported in California. In 1927 the first recorded shipments of titanium minerals were made in California. The total of the 1927 and 1928 production was 10,013 tons valued at \$150,195. All of this came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains.

The market price of titanium minerals varies as to the titanium oxide it contains. Present (Sept. 29, 1938) quotations are: Rutile 94% TiO at 10¢ a pound, ilmenite 45 to 52% TiO at \$10 to \$12 a ton, all prices Atlantic seaboard.

TUNGSTEN

Bibliography: Reports XV, XVII, XVIII, XXII, XXIV, XXVII (inc.) XXX. Bulletins 38, 67, 91, 95, U. S. G. S., Bull. 652. Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666-669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920-1922 inclusive. The material shipped in 1937 was high-grade sorted ore and concentrates, coming from four properties

in Inyo County, two in San Bernardino County, and a single property each in Kern and Tulare counties. A total of 567 short tons of concentrates averaging 64.623% WO_3 was reported shipped yielding 36,461 units, or 611 tons recalculated to 60% WO_3 and valued at \$782,187 at the mine. The 1937 output showed an increase in both quantity and value as compared with that of 1936, which was 236 tons worth \$210,819.

Quotations in "Metal and Mineral Markets" during 1937 for Chinese wolframite duty paid started the year at \$15.75 a unit WO_3 , increasing in price to the latter part of September when it was \$38 a unit WO_3 , then receding to the end of the year, at \$25 a unit WO_3 . Domestic scheelite started the year at \$16 a unit WO_3 , in September reached \$35 a unit WO_3 and ended the year at from \$22 to \$24 a unit WO_3 . Present (April, 1938) prices per unit WO_3 at New York are: Chinese wolframite, duty paid, \$19.50; scheelite, \$16 to \$19.

Imports of foreign tungsten ores and alloys in the United States during 1937, according to the U. S. Bureau of Foreign and Domestic Commerce, totaled 10,189,625 pounds valued at \$2,940,038, compared with 6,648,527 pounds worth \$1,529,658 in 1936. The Tariff Act of 1930 raised the duty on tungsten ore or concentrates to 50 cents per pound on the metallic tungsten contained therein. Duties are also provided for imported tungsten-bearing alloys.

Tungsten ore has been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, followed by the Bishop district in Inyo County, with small amounts coming from Nevada County and from the district near Goffs, in eastern San Bernardino. Most of California's tungsten ore is scheelite (calcium tungstate), though wolframite (iron-manganese tungstate) and hübnerite (manganese tungstate) also occur. The deposits at Atolia are the largest and most productive scheelite deposits known.

Total Tungsten Ore Production of California.

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60% WO_3 :

Year	Tons at 60% WO_3	Value	Year	Tons at 60% WO_3	Value
1905.....	57	\$18,800	1923.....	34	\$19,126
1906.....	485	189,100	1924.....	781	446,009
1907.....	287	120,587	1925.....	573	348,475
1908.....	105	37,750	1926.....	441	316,560
1909.....	577	190,500	1927 ^a	389	429,237
1910.....	457	208,245	1928 ^a	150	106,280
1911.....	387	127,706	1929.....	120	82,582
1912.....	572	206,000	1930 ^a	148	9,509
1913.....	559	234,673	1931 ^a	26	76,605
1914.....	420	180,575	1932.....	148	224,417
1915.....	962	1,005,467	1933.....	118	194,542
1916.....	2,270	4,571,521	1934.....	236	210,819
1917.....	2,466	3,079,013	1935.....	611	782,187
1918.....	1,982	2,832,222	1936.....		
1919.....	214	219,316	1937.....		
1920.....			Totals.....	15,697	\$16,467,719

^a Annual details concealed under 'Unapportioned.'

VANADIUM

Bibliography: Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

Present (May 26, 1938) New York quotations for ferrovanadium are \$2.70-\$2.90 per pound of vanadium f.o.b. works, and vanadium ore 27½¢ per pound V_2O_5 contained.

ZINC

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XX-XXIV, XXVI, XXVII, XXX, XXXIII, XXXIV. Bulletins 38, 67, 91.

The recoverable zinc mined in California during 1937 amounted to 39,643 pounds valued at \$2,577, compared with the 1936 output of 29,740 pounds worth \$1,487. The 1937 output came from Inyo and San Bernardino counties.

The zinc ores of Shasta and Calaveras counties are associated with copper, while those of Inyo, Los Angeles, and San Bernardino are associated principally with lead-silver and zinc-silver ores.

The production of metallic zinc¹ at reduction plants in the United States during 1937 amounted to 608,458 short tons valued at \$79,100, of which 5,739 tons was reduced from foreign ores and 51,554 tons from secondary metal. The 1937 output was an increase over that of 1936, which was 534,341 short tons worth \$53,434.

The average price per pound for zinc in 1937 was 6.5¢ compared with 5¢ in 1936, 4¢ in 1935, and 4.3¢ in 1933.

Total Zinc Production of California.

Total figures for zinc output of the State are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906.....	206,000	\$12,566	1922.....	3,034,430	\$172,963
1907.....	177,759	10,598	1923.....	.....	.....
1908.....	54,000	3,544	1924.....	3,060,000	198,900
1909.....	.....	.....	1925.....	11,546,602	877,542
1910.....	.....	.....	1926.....	20,447,559	1,533,568
1911.....	2,679,842	152,751	1927.....	8,625,004	552,000
1912.....	4,331,391	298,866	1928.....	.....	.....
1913.....	1,157,947	64,845	1929.....	.....	.....
1914.....	399,641	20,381	1931.....	149,865	5,314
1915.....	13,043,411	1,617,383	1932.....	.....	.....
1916.....	15,950,565	2,137,375	1933.....	290,222	12,189
1917.....	11,854,804	1,209,190	1934.....	721,719	31,034
1918.....	5,565,516	506,466	1935.....	328,013	14,432
1919.....	1,384,182	101,046	1936.....	29,740	1,487
1920.....	1,188,009	96,229	1937.....	39,643	2,577
1921.....	846,184	42,309	Totals.....	107,112,106	\$9,675,555

¹ U. S. Bureau of Mines, Mineral Market Report 641, April 16, 1938.

CHAPTER FOUR

STRUCTURAL MATERIALS

Bibliography: State Mineralogist Reports XII-XXXII (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which previous to 1933 was listed under structural materials in the statistical reports of the State Division of Mines, is now transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

This branch of the mineral industry for 1937 was valued at \$37,976,626, as compared with a total of \$38,503,997 for the year 1936. All the materials grouped under this classification showed an increased value in 1937, with the exception of bituminous rock, cement, granite, and slate.

In 1937 all counties, with the exception of Kings, contributed to this structural total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification.

The following summary shows the value of the structural materials produced in California during the years 1936-1937, with increases or decreases in each instance:

Substance	1936		1937		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Brick and hollow building tile		\$2,240,905		\$3,083,902	\$842,997+
Cement	13,300,188 bbls.	18,314,589	12,072,062 bbls.	16,546,229	1,768,360—
Granite		244,243		207,738	36,505—
Lime	64,275 tons	633,678	69,532 tons	681,277	47,599—
Marble ^a		23,011		23,667	656+
Sandstone		9,180		15,680	6,500+
Slate		49,818		32,572	17,246—
Stone, miscellaneous		16,578,238		16,917,683	339,445+
Unapportioned		410,335		467,876	57,543+
Total values		\$38,503,997		\$37,976,626	
Net increase					\$527,371+

^a Includes onyx and travertine.

^b Includes bituminous rock, magnesite, tube-mill pebbles.

ASPHALT

Bibliography: State Mineralogist Reports VII, X, XII-XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the oil industry, considerable asphalt was produced from outcroppings of oil sand, and was a separate industry from the production of oil itself.

However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

BITUMINOUS ROCK

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXH, XXV, XXVI, XXXI.

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1937 shipments of bituminous rock were made from Santa Barbara and Santa Cruz counties with a single producer in each. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The total of the 1935 and 1936 yield was 41,681 short tons valued at \$133,344. The 1937 output showed a decrease in both amount and value over that of 1936.

Bituminous Rock Production of California, by Years.

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

Year	Tons	Value	Year	Tons	Value
1887.....	36,000	\$160,000	1913.....	37,541	\$78,479
1888.....	50,000	257,000	1914.....	66,119	166,618
1889.....	40,000	170,000	1915.....	17,789	61,468
1890.....	40,000	170,000	1916.....	19,449	66,561
1891.....	39,962	154,164	1917.....	5,590	18,580
1892.....	24,000	72,000	1918.....	2,561	9,067
1893.....	32,000	192,036	1919.....	4,614	18,537
1894.....	31,214	115,193	1920.....	5,450	27,825
1895.....	38,921	121,586	1921.....	8,298	43,192
1896.....	49,456	122,500	1922.....	4,624	13,570
1897.....	45,470	128,173	1923.....	2,945	11,780
1898.....	46,836	137,575	1924.....	6,040	14,922
1899.....	40,321	116,097	1925.....	2,681	10,724
1900.....	25,308	71,495	1926.....	3,863	21,577
1901.....	24,052	66,354	1927.....	3,515	17,704
1902.....	33,490	43,411	1928.....	4,966	33,832
1903.....	21,944	53,106	1929.....	3,320	14,360
1904.....	45,280	175,680	1930.....	8,525	36,075
1905.....	24,753	60,436	1931.....		
1906.....	16,077	45,204	1932*.....	23,653	109,140
1907.....	24,122	72,835	1933.....		
1908.....	30,718	109,818	1934*.....	36,793	130,301
1909.....	34,123	116,436	1935.....		
1910.....	87,547	165,711	1936*.....	41,681	133,344
1911.....	75,125	117,279	1937.....		*
1912.....	44,073	87,467			
			Totals.....	1,310,807	\$4,139,212

* Annual details concealed under 'Unapportioned.'

BRICK AND HOLLOW TILE

Bibliography: State Mineralogist Reports VIII, X, XII-XV (inc.), XVII-XXVIII (inc.), XXXII. Bulletins 38, 99. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5-6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a state with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius.

We also include under this heading the various forms of hollow building 'tile' or blocks. The application of this tile to residence construction as well as to other structures has grown, though their total output for 1937 showed an increase in value and tonnage as compared with the 1936 production.

The 1937 output of all kinds of brick in California showed an increase in value of 34 per cent and an increase in amount of 12 per cent as compared with that of 1936. The 1936 production consisted of 122,676 M. of common brick valued at \$1,301,825; 22,000 M. of fire brick valued at \$1,364,696; 4,157 M. of glazed, pressed fancy and vitrified paving-brick valued at \$148,203; and 17,521 tons of hollow building tile valued at \$270,078; which gave a total value for the year for brick and hollow building-tile of \$3,083,902. The 1936 output had a total value of \$2,240,905.

Los Angeles County had the largest production of brick and hollow building-tile in 1937 with fifteen companies producing 67,398 M. of common brick worth \$727,910; 11,532 M. of fire brick worth \$808,249; 1,470 M. of fancy, glazed and pressed brick worth \$50,662; and 6,355 tons of hollow building-tile worth \$45,122. Contra Costa County with three plants operating had a production of brick and hollow building-tile valued at \$497,543; Santa Clara with three plants output of brick was valued at \$219,087. There were two operating plants each in Alameda, Amador, Kern, Sacramento, San Diego, San Joaquin, and Santa Barbara counties and one each in Fresno, Humboldt, Orange, Placer, Riverside, San Bernardino, and Tulare counties. Included in the output of Alameda County was some face hollow building-tile and from Orange County was included Spanish brick.

Brick and Hollow-Tile Production of California, by Years.

Record of brick production in the state has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

Year	Brick, M	Hollow building blocks, tons	Value
1893.....	103,900		\$801,750
1894.....	81,675		457,125
1895.....	131,772		672,360
1896.....	24,000		524,740
1897.....	97,468		563,240
1898.....	100,102		571,362
1899.....	125,950		754,730
1900.....	137,191		905,210
1901.....	130,766		860,488
1902.....	169,851		1,306,215
1903.....	214,403		1,999,546
1904.....	281,750		1,994,740
1905.....	286,618		2,273,786
1906.....	277,762		2,538,848
1907.....	362,167		3,438,951
1908.....	332,872		2,506,495
1909.....	333,846		3,059,929
1910.....	340,883		2,934,731
1911.....	327,474		2,638,121
1912.....	337,233		2,940,290
1913.....	358,754		2,915,350
1914.....	270,791		2,288,227
1915.....	180,538		1,678,756
1916.....	206,960		2,096,570
1917.....	192,269	29,348	2,532,721
1918.....	136,374	34,818	2,363,481
1919.....	156,328	36,026	3,087,067
1920.....	245,842	99,208	5,704,393
1921.....	238,022	67,100	5,570,875
1922.....	374,853	105,909	7,994,991
1923.....	397,754	122,534	9,738,082
1924.....	456,716	114,469	9,137,908
1925.....	361,094	105,491	7,503,976
1926.....	388,048	90,332	7,026,124
1927.....	374,111	75,116	6,516,077
1928.....	272,443	66,277	5,694,770
1929.....	327,011	66,713	5,607,410
1930.....	267,019	68,047	4,205,460
1931.....	151,545	51,988	2,560,415
1932.....	90,683	27,098	1,605,086
1933.....	76,905	25,814	1,520,481
1934.....	66,738	17,534	1,644,661
1935.....	76,521	21,309	1,855,343
1936.....	131,667	16,081	2,240,905
1937.....	148,833	17,521	3,083,902
Totals.....	10,445,502	1,258,733	\$140,015,688

CEMENT

Bibliography: State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI-XXVIII (inc.) XXXII. Bulletin 38.

During 1937 there was a production of 12,072,062 barrels of cement in California, valued at \$16,546,229 f.o.b. plant, of which 4,339,320 barrels came from northern California plants, and 7,732,742 barrels came from southern California plants. The 1937 output was a decrease over that of 1936, which was 13,300,188 barrels worth \$18,314,589.

Shipments during 1937 were made from ten plants in nine counties to the extent of 11,721,818 barrels valued at \$16,868,379, as compared with 12,994,393 barrels worth \$18,090,256. There were five plants in operation in northern California—one each in Calaveras, Contra Costa, Merced, San Mateo, Santa Cruz counties, which shipped 4,284,965 barrels of cement; and five plants in southern California, two in San Bernardino County and one each in Kern, Los Angeles¹ and Riverside counties, which shipped 7,436,853 barrels of cement. There were 2,157 men employed in the above plants during the year 1937.

¹The plant in Los Angeles County grinds clinker coming from other counties, therefore the crude material is credited to the point of origin.

Cement Production of California, by Years.

'Portland' cement was first commercially produced in California in 1891; though in 1860 and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859-60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then \$4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000 barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to \$2.50 a barrel, about the same as it is today."¹

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the State. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920-1931 annually exceeded the value of her gold output.

Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891.....	5,000	\$15,000	1915.....	4,918,275	\$6,044,950
1892.....	5,000	15,000	1916.....	5,299,507	6,210,293
1893.....			1917.....	5,790,734	7,544,282
1894.....	8,000	21,600	1918.....	4,772,921	7,969,909
1895.....	16,383	32,556	1919.....	4,645,289	8,591,990
1896.....	9,500	28,250	1920.....	6,709,160	14,962,945
1897.....	18,000	66,000	1921.....	7,404,221	18,072,120
1898.....	50,000	150,000	1922.....	8,962,135	16,524,056
1899.....	60,000	180,000	1923.....	10,825,405	25,999,203
1900.....	52,000	121,000	1924.....	11,655,131	23,225,850
1901.....	71,800	159,842	1925.....	13,206,630	25,043,335
1902.....	171,000	423,600	1926.....	13,797,173	25,269,678
1903.....	640,868	968,727	1927.....	14,661,783	26,474,935
1904.....	969,538	1,539,807	1928.....	13,625,231	24,463,287
1905.....	1,265,553	1,791,916	1929.....	12,794,729	21,038,565
1906.....	1,286,000	1,941,250	1930.....	9,831,938	14,575,731
1907.....	1,613,563	2,585,577	1931.....	7,693,712	11,510,655
1908.....	1,629,615	2,359,692	1932.....	5,657,549	7,967,107
1909.....	3,779,205	4,969,437	1933.....	7,284,081	10,331,395
1910.....	5,453,193	7,485,715	1934.....	8,936,085	12,445,616
1911.....	6,371,369	9,085,625	1935.....	8,086,292	10,120,721
1912.....	6,198,634	6,074,661	1936.....	13,300,188	18,314,589
1913.....	6,167,806	7,743,024	1937.....	12,072,062	16,546,229
1914.....	5,109,218	6,558,148			
			Totals.....	252,881,426	\$413,563,858

GRANITE

Bibliography: State Mineralogist Reports X, XII-XXVI (inc.), XXVIII, XXXI. Bulletin 38.

The 1937 output of granite in California amounted to 45,555 cu. ft. of building stone valued at \$75,722; 34,198 cu. ft. of monumental stone valued at \$95,080; 1,100 linear ft. of curbing valued at \$2,300; and 434,545 cu. ft. of unclassified material including a small amount of tuff and volcanic rock which was used as building stone, and for flag-stone, having a value of \$34,636; giving a total value for the year's yield at \$207,738. This was a decrease from the 1936 total value which was \$244,243. The 1937 output came from seventeen quarries in thirteen counties, four of which were in San Diego County; two in Fresno County; and one each in Lassen, Los Angeles, Madera, Mari-

¹ Monthly Review of Mercantile Trust Co. of Calif., Vol. XIII, No. 3, p. 55, Mar. 1924.

posa, Nevada, Placer, Plumas, Riverside, San Bernardino, Sonoma, and Ventura counties. The material from Los Angeles was a mica schist; that from Sonoma County a tuff and that from Ventura County a volcanic rock.

So far as possible, granite production has been segregated in the statement herewith into the various uses to which the product was put. It will be noted, however, that a portion of the output has been entered under the heading 'Unclassified.' This is necessary because of the fact that some of the producers have no way of telling to what specific use their stone was put after they had quarried and sold the same in the rough.

Varieties.

For building purposes, the granite found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notably at Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called 'black granite,' whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also a similar 'black granite' in Tulare County, near Success.

Granite Production of California, by Years.

The value of granite produced, annually, since 1887 has been as follows:

Year	Value	Year	Value
1887	\$150,000	1913	\$981,277
1888	57,000	1914	628,786
1889	1,329,018	1915	227,928
1890	1,200,000	1916	535,339
1891	1,300,000	1917	221,997
1892	1,000,000	1918	139,861
1893	531,322	1919	220,743
1894	228,816	1920	495,732
1895	224,329	1921	725,901
1896	201,004	1922	676,643
1897	188,024	1923	760,081
1898	147,732	1924	1,211,046
1899	141,070	1925	1,853,859
1900	295,772	1926	655,332
1901	519,285	1927	1,398,443
1902	255,239	1928	763,996
1903	678,670	1929	1,169,271
1904	467,472	1930	855,477
1905	353,837	1931	636,741
1906	344,083	1932	398,676
1907	373,376	1933	183,706
1908	512,923	1934	249,083
1909	376,834	1935	339,917
1910	417,898	1936	244,243
1911	355,742	1937	207,738
1912	362,975		
		Total	\$27,794,237

LIME

Bibliography: Reports XIV, XV, XVII-XXIX (inc.), XXXIII, Bulletin 38.

In California during 1937 there was an output of lime amounting to 69,532 short tons valued at \$681,277, coming from two plants each in El Dorado and San Bernardino counties; and one each in Alameda, Santa Cruz, Sonoma, and Tuolumne counties. The above figures showed an increase in both amount and value over those of 1936 which were 64,275 tons worth \$633,678.

So far as we have been able to segregate the data, these figures include mainly only such lime as is used in building operations; though they do include a small proportion of calcined lime employed in agriculture and the chemical industries, the figures for which were not separable. A portion is hydrated lime. Limestone utilized in sugar making, for smelter flux, as a fertilizer, and other special industrial uses, is classified under 'Industrial Materials.' That consumed in cement manufacture is included in the value of cement.

Lime Production of California, by Years.

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for quantity have been recalculated from 'barrels', as shown in the earlier reports, to 'tons' for the years 1894-1922 (inc.):

Year	Tons	Value	Year	Tons	Value
1894	37,350	\$318,700	1917	50,073	\$311,380
1895	39,776	386,094	1918	43,684	461,315
1896	30,275	261,505	1919	42,070	552,043
1897	28,780	252,900	1920	46,314	557,232
1898	29,786	254,010	1921	46,353	610,619
1899	29,985	314,575	1922	57,875	671,747
1900	31,252	283,699	1923	70,894	788,834
1901	31,738	334,688	1924	62,029	703,355
1902	44,866	369,616	1925	61,922	685,528
1903	49,659	418,280	1926	63,568	670,837
1904	57,945	571,749	1927	60,498	631,497
1905	61,700	555,322	1928	56,616	547,919
1906	68,927	763,060	1929	42,834	417,101
1907	68,422	756,376	1930	47,662	452,084
1908	39,639	379,243	1931	36,189	360,523
1909	52,075	577,824	1932	27,510	254,223
1910	47,951	477,683	1933	33,425	271,619
1911	42,959	390,988	1934	32,500	309,765
1912	52,212	464,440	1935	59,731	573,212
1913	61,344	528,547	1936	64,275	633,678
1914	43,996	378,663	1937	69,532	681,277
1915	35,653	286,304			
1916	49,364	390,475	Totals	2,111,308	\$20,860,529

MAGNESITE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXVII (inc.), XXX, XXXI. Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450-453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng. Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305-388, 418-444. Eng. & Min. Jour.-Pres., Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

The production of crude magnesite in California during 1937 came from a single property each in Santa Clara and Stanislaus counties, both being operated by the same company. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of this single operator. Practically all was shipped in the calcined form.

The output for 1937 showed an increase in both quantity and value over that of 1936. The 1936-1937 production showed a total of 94,491 short tons of crude magnesite valued at \$734,443, of which only a small amount was sold as such. Most of this material was calcined. The operators' reports showed that a total of 39,364 short tons of calcined material valued at \$1,016,843 rail-shipping point, was made during 1936-1937 and was both dead-burned and periclase for refractories, and material for the plastic trade. From two to two and one-half tons of crude material are required to make one ton of calcined. The average price of crude magnesite reported in 1937 was \$8.25 per ton, compared with \$7.25 per ton in 1936, \$6.70 per ton in 1935, \$6.50 per ton in 1934, \$5.60 per ton in 1933, and \$10.00 per ton in 1932.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property.

Imports.

The tariff act of 1930 placed the following import duties on magnesite: Crude magnesite 15/32¢ per lb., caustic calcined magnesite 15/16¢ per lb., dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40¢ per lb.; magnesite brick $\frac{3}{4}$ ¢ per lb., and 10 per cent ad valorem. The figures of imports for 1937, as published by the U. S. Bureau of Foreign and Domestic Commerce, show a total of 58,853 short tons valued at \$857,780 as compared with 44,863 tons worth \$713,371 in 1936.

Total Magnesite Production of California.

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,¹ southeast of Livermore, Alameda County. Shipments amounting to

¹ See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.

'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

Total Magnesite Production of California

Year	Tons	Value	Year	Tons	Value
1887.....	600	\$9,000	1913.....	9,632	\$77,056
1888.....	600	9,000	1914.....	11,438	114,380
1889.....	600	9,000	1915.....	30,271	283,461
1890.....	600	9,000	1916.....	154,052	1,311,893
1891.....	1,500	15,000	1917.....	209,648	1,976,227
1892.....	1,500	15,000	1918.....	83,974	803,492
1893.....	1,093	10,930	1919.....	44,696	452,094
1894.....	1,440	10,240	1920.....	83,695	1,033,491
1895.....	2,200	17,000	1921.....	47,837	511,102
1896.....	1,500	11,000	1922.....	55,637	594,665
1897.....	1,143	13,671	1923.....	73,963	946,643
1898.....	1,263	19,075	1924.....	67,236	900,183
1899.....	1,280	18,480	1925.....	64,623	872,944
1900.....	2,252	19,333	1926.....	50,915	587,642
1901.....	4,726	43,057	1927.....	46,093	577,887
1902.....	2,830	20,655	1928.....	45,645	501,590
1903.....	1,361	20,515	1929.....	47,269	488,014
1904.....	2,850	9,298	1930.....	38,681	388,472
1905.....	3,933	16,221	1931.....	21,576	182,283
1906.....	4,032	40,320	1932)*.....	40,303	282,325
1907.....	6,405	57,720	1933)*.....		
1908.....	10,582	80,822	1934)*.....		
1909.....	7,942	62,588	1935)*.....	62,509	413,228
1910.....	16,570	113,887	1936)*.....		
1911.....	8,858	67,430	1937)*.....	94,491	734,443
1912.....	10,512	105,120			
			Totals.....	1,482,806	\$14,856,877

* Combined under 'Unapportioned.'

MARBLE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXX (inc.). Bulletin 38. U. S. Bur. of Mines Bull. 106.

The 1937 production of marble in California was valued at \$23,667 (including some onyx and travertine from San Bernardino County, and a small amount of limestone used as building stone and flagstone coming from a single operator each in Los Angeles, San Luis Obispo, and Santa Barbara counties). The marble came from a single quarry in Tuolumne County. The 1937 output showed an increase in value over that of 1936, which was worth \$23,011.

California has many beautiful and serviceable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

Marble Production of California, by Years.

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

Total Production of Marble in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		\$5,000	1913	41,654	\$113,282
1888		5,000	1914	25,436	48,832
1889		87,030	1915	22,186	41,518
1890		80,000	1916	25,954	50,280
1891		100,000	1917	24,755	62,950
1892		115,000	1918	^a 17,428	49,898
1893		40,000	1919	25,020	74,482
1894	38,441	98,326	1920	^b 29,531	92,899
1895	14,864	56,566	1921	30,232	98,395
1896	7,889	32,415	1922	38,321	127,792
1897	4,102	7,280	1923	28,015	124,919
1898	8,050	23,594	1924	^b 61,579	140,253
1899	9,682	10,550	1925	35,664	116,105
1900	4,103	5,891	1926	34,806	119,999
1901	2,945	4,630	1927	^b 42,308	103,689
1902	19,305	37,616	1928	^b 34,324	82,190
1903	84,624	97,354	1929	^b 72,881	93,661
1904	55,401	94,208	1930	^b 65,775	82,194
1905	73,303	129,450	1931	^b 37,776	81,760
1906	31,400	75,800	1932	^b 25,506	42,505
1907	37,512	118,066	1933	^b 9,039	23,178
1908	18,653	47,665	1934	^b 7,185	10,759
1909	79,600	238,400	1935	(b)	9,884
1910	18,960	50,200	1936	(b)	23,011
1911	20,201	54,103	1937	(b)	23,667
1912	27,820	74,120			
			Total.....		\$3,526,366

^a Includes onyx and serpentine.
^b Includes onyx and travertine.

ONYX and TRAVERTINE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII, XVIII, XXI, XXIII, XXXI. Bulletin 38.

Onyx and travertine are known to exist in a number of places in California, but there has been only a small and irregular production since the year 1896. In 1937 there were two producers of onyx in San Bernardino County. The 1937 output showed an increase in both quantity and value over that of 1936, the figures of which are combined with marble. This material is used in terrazzo, auto gear-shift handles, bases for fountain-pen desk sets, and other ornamental purposes.

Onyx Production of California, by Years.

Production by years has been as follows:

Year	Value	Year	Value
1887	*	1923	\$2,510
1888	\$900	1924	*
1889	900	1925	16,120
1890	900	1926	7,575
1891	1,500	1927	*
1892	2,400	1928	*
1893	1,800	1929	*
1894	27,000	1930	*
1895	20,000	1931	*
1896	12,000	1932	*
1918	24,000	1933	*
1919	*	1934	*
1920	*	1935	*
1921	1,294	1936	*
1922	3,320	1937	*
		Total value.....	\$122,219

* See under Marble.

SANDSTONE

Bibliography: State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.). Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. In 1937 a total of 73,190 cu. ft. of sandstone valued at \$15,680 was quarried in California, and came from three properties in Monterey County and one each in Los Angeles, San Luis Obispo, and Sonoma counties.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone. Part of the material coming from Los Angeles County was schist and indurated shale.

Sandstone Production of California, by Years.

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		\$175,000	1913	62,227	\$27,870
1888		150,000	1914	111,691	45,322
1889		175,598	1915	63,350	8,438
1890		100,000	1916	17,270	10,271
1891		100,000	1917	31,090	7,074
1892		50,000	1918	900	400
1893		26,314	1919	5,400	3,720
1894		113,592	1920	10,500	2,300
1895		35,373	1921	10,150	2,112
1896		28,379	1922	900	1,100
1897		24,086	1923	7,000	13,000
1898		46,384	1924	6,700	3,600
1899	56,264	103,384	1925	14,704	14,362
1900	378,468	254,140	1926	34,100	17,500
1901	266,741	192,132	1927	222,900	205,400
1902	212,123	142,506	1928	134,100	43,250
1903	253,002	585,309	1929	177,655	49,881
1904	363,487	567,181	1930	160,704	56,404
1905	302,813	483,268	1931	110,244	30,900
1906	182,076	164,068	1932	41,793	13,286
1907	159,573	148,148	1933	25,980	10,888
1908	93,301	55,151	1934	21,738	14,245
1909	79,240	37,032	1935	38,426	9,268
1910	165,971	80,443	1936	24,705	9,180
1911	255,313	127,314	1937	73,190	15,680
1912	66,487	22,574			
			Total value.....		\$4,602,787

SERPENTINE

Bibliography: State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switch-

boards. As there was but a single operator, the figures were combined with those of marble output for those years.

Serpentine Production of California, by Years.

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

Serpentine Production in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1895.....	4,000	\$4,000	1904.....	200	\$2,310
1896.....	1,500	6,000	1905.....		
1897.....	2,500	2,500	1906.....	847	1,694
1898.....	750	3,000	1907.....	1,000	3,000
1899.....	500	2,000	1917.....	^a	^a
1900.....	350	2,000	1918.....	^b	^b
1901.....	89	890	1919.....		
1902.....	512	5,065			
1903.....	99	800	Totals.....	12,347	\$33,259

^a Under 'Unapportioned.'

^b See under Marble.

SLATE

Bibliography: State Mineralogist Reports XV, XVIII, XXIV, XXVIII. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

The production of slate in California during 1937 amounted to 5,036 short tons and 440 squares, having a total value of \$32,572 f.o.b. quarry and came from properties in Calaveras, El Dorado, Los Angeles, Inyo, and Tuolumne counties.

The 1937 figures showed a decrease in both amount and value over those of 1936 which were 12,252 tons and 65 squares having a total value of \$49,818. Practically all the slate was crushed and used for roofing granules. The slate shingles came from Calaveras County, and that from Los Angeles County was sold as flagstone.

Total Production of Slate in California.

A complete record of amount and value of slate produced in California follows:

Year	Squares	Value	Year	Squares	Value
1889.....	4,500	\$18,089	1910.....	1,000	\$8,000
1890.....	4,000	24,000	1911.....		
1891.....	4,000	24,000	1915.....	1,000	5,000
1892.....	3,500	21,000	1916.....		
1893.....	3,000	21,000	1920.....	8	80
1894.....	1,800	11,700	1921.....		
1895.....	1,350	9,450	1922.....	200	2,400
1896.....	500	2,500	1923.....		
1897.....	400	2,800	1926.....	(a)	7,371
1898.....	400	2,800	1927.....	b2,686	17,960
1899.....	810	5,900	1928.....	b4,075	31,263
1900.....	3,500	26,250	1929.....		
1901.....	5,100	38,250	1930/*.....	b8,220	71,347
1902.....	4,000	30,000	1931.....		
1903.....	10,000	70,000	1932/*.....	b8,234	55,182
1904.....	6,000	50,000	1933.....	b5,343	31,958
1905.....	4,000	40,000	1934.....	b5,065	24,245
1906.....	10,000	100,000	1935.....	(a)	40,912
1907.....	7,000	60,000	1936.....	(a)	49,818
1908.....	6,000	60,000	1937.....	(a)	32,572
1909.....	6,961	45,660	Total.....		\$1,046,507

* Annual details concealed under 'Unapportioned.'

a Quantity not shown as both 'squares' and 'tons' included.

b Tons.

MISCELLANEOUS STONE

Bibliography: State Mineralogist Reports XII-XXVIII (inc.), XXXI-XXXII. Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

During 1937 the output of sand and gravel and that of crushed rock showed an increase in both amount and value over that of the previous year. There was a total value of \$16,917,683 for 'miscellaneous stone' during 1937, compared with \$16,578,238 for 1936. As in the past, Los Angeles County led in the annual output of these

products, its 1937 yield being worth \$8,655,018; Alameda County second with an output worth \$1,361,781; Contra Costa County third with an output worth \$518,760; Sacramento County with an output worth \$513,699; followed in turn by San Benito, Riverside, San Diego, San Bernardino, Marin, and Santa Clara counties.

Paving Blocks.

During 1937 there were no paving blocks reported produced in California.

There was a small output of paving blocks in California during 1934 coming from a single property each in Napa and Sacramento counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal production of either operator.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made in Solano County were of basalt; those from Sonoma are of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego are of granite; and those from San Mateo County a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

Year	Amount M	Value	Year	Amount M	Value
1887	*10,000	\$350,000	1912	11,018	\$578,355
1888	10,500	367,500	1913	6,364	363,505
1889	7,303	297,236	1914	6,053	270,598
1890	7,000	245,000	1915	3,285	171,092
1891	5,000	150,000	1916	1,322	54,362
1892	*3,000	96,000	1917	938	38,567
1893	2,770	96,950	1918	372	17,000
1894	2,517	66,981	1919	27	1,350
1895	2,332	73,338	1920	63	3,155
1896	4,161	77,584	1921	4	280
1897	1,711	35,235	1922	72	3,924
1898	1,144	21,725	1923	15	880
1899	305	7,861	1924	11	935
1900	1,192	23,775	1925	27	1,350
1901	1,920	41,075	1926		
1902	3,502	112,437	1927	41	2,057
1903	4,854	134,642	1928	25	1,658
1904	3,977	161,752	1929		
1905	3,408	134,347	1930		
1906	4,203	173,432	1931 ^a	66	5,900
1907	4,604	199,347	1932		
1908	7,660	334,780	1934	2	75
1909	4,503	199,803	1935		
1910	4,434	198,916			
1911	4,141	210,819	Totals	135,840	\$5,325 578

* Figures for 1887-1892 (inclusive) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.

^a Annual details concealed under 'Unapportioned.'

Grinding-Mill Pebbles.

The 1937 output of grinding-mill pebbles in California is combined under the 'Unapportioned' item to conceal the production of a single operator in Siskiyou County.

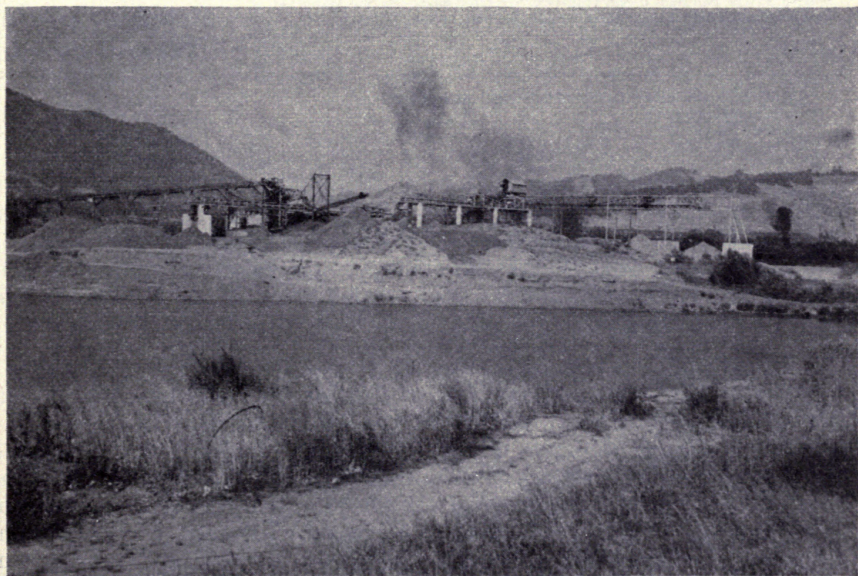
The amount and value of grinding-mill pebbles, annually, follows:

Year	Tons	Value	Year	Tons	Value
1915	340	\$2,810	1928	372	\$2,408
1916	20,232	107,567	1929		
1917	21,450	90,538	1930	166	1,225
1918	8,628	61,268	1931		
1919	2,607	19,272	1932	25	211
1920	2,104	17,988	1933		
1921	247	1,418	1934	300	3,018
1922	1,571	7,628	1935		
1923	2,650	14,936	1936	961	8,356
1924	434	2,969	1937	*	*
1925	215	1,385			
1926	102	612	Totals	62,692	\$275,409
1927	288	1,800			

* Annual details concealed under 'Unapportioned.'

Sand and Gravel.

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.



Healdsburg gravel plant of Basalt Rock Co. on Russian River, Healdsburg, Sonoma County

Photo by Walter W. Bradley

The distribution of the 1937 output of sand and gravel by counties is given in the following table:

County	Tons	Value
Alameda (a).....	1,525,254	\$1,055,019
Butte.....	78,593	40,405
Calaveras.....	8,976	5,000
Contra Costa (a).....	219,772	150,569
Fresno.....	140,732	99,393
Glenn.....	325,715	88,928
Humboldt.....	238,565	70,596
Imperial.....	180,241	182,619
Kern.....	172,120	57,872
Lake.....	65,030	17,258
Lassen.....	70,418	31,984
Los Angeles (b).....	4,984,714	2,239,220
Mariposa.....	11,886	7,630
Modoc.....	42,418	20,781
Mono.....	122,603	87,253
Monterey (a) (b) (c).....	224,915	206,700
Napa.....	9,250	4,812
Nevada.....	122,952	84,326
Orange.....	213,371	103,544
Plumas.....	37,106	19,808
Riverside (a) (b).....	202,114	163,497
Sacramento (a).....	305,247	208,438
San Bernardino.....	519,584	271,528
San Diego (a) (b) (c).....	298,784	255,833
San Joaquin.....	161,066	88,624
Santa Clara.....	197,769	86,129
Sierra.....	1,495	868
Siskiyou.....	55,153	31,169
Stanislaus.....	84,315	57,147
Tehama.....	30,677	17,406
Tulare.....	118,453	77,578
Tuolumne.....	2,581	1,785
Ventura.....	250,883	154,890
Yolo (a).....	93,469	40,765
Yuba.....	99,435	57,195
Alpine, Amador, Colusa, Del Norte, El Dorado, Inyo, Madera, Marin, Mendocino, Merced, Placer, San Benito, San Francisco, San Luis Obispo (a), San Mateo (a), Santa Barbara, Santa Cruz, Shasta, Solano, Sonoma, Sutter, Trinity*	1,090,534	587,407
Totals.....	12,303,190	\$6,673,976

* Combined to conceal the output of individual operators in each.

a Includes molding sand.

b Includes blast sand.

c Includes filter sand.

Included in the above is a total of 58,489 tons of molding sand valued at \$131,906 coming from two properties in Contra Costa County; and one each in Alameda, Monterey, Riverside, Sacramento, San Diego, San Luis Obispo, San Mateo, and Ventura counties. The 1937 yield showed an increase compared with 1936 which was 49,887 tons worth \$124,333.

Crushed Rock.

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on the selling price, f.o.b. cars, barges, or trucks, at the quarry.

Crushed Rock Production, by Counties, for 1937

County	Macadam and ballast		Rubble and riprap		Concrete		Unclassified		Totals	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda.....	162,860	\$125,645			63,725	\$63,842	^a 197,851	\$117,275	424,436	\$206,762
Butte.....	67,920	40,695			18,443	15,443	^a 103,385	119,748	189,748	178,886
Calaveras.....	3,058	2,500			*	*	*	*	3,058	2,500
Contra Costa.....	152,938	133,270	33,250	\$83,195	*	*	196,631	169,741	383,119	336,206
El Dorado.....	9,981	11,130	931	3,275	*	*			10,912	14,405
Imperial.....							20,482	15,362	20,482	15,362
Inyo.....	43,937	36,373			94,395	129,514	704	1,619	704	1,619
Kern.....	49,450	29,014			650	759	^a 4,733	13,998	143,065	179,885
Lassen.....	b192,191	73,513	840,895	1,010,048	169,286	84,290	1,500	1,500	51,600	31,273
Los Angeles.....			2,651	1,775	* 700	500	b10,255,166	5,247,947	11,457,988	6,415,798
Madera.....	54,945	67,773	41,025	49,231	* 200	400	184,129	138,129	280,099	255,133
Mariposa.....	21,540	32,580	11,648	24,673	*	*	*	*	33,388	57,653
Merced.....	10,548	16,597			*	*	*	*	15,300	16,597
Modoc.....	18,300	14,600							18,300	14,600
Nevada.....	117,525	125,594	*	*	9,713	9,750	*	*	127,238	133,254
Norwalk.....	44,000	44,000					*	*	44,000	44,000
Plumas.....			1,170	509			*	*	1,170	509
Riverside.....	30,512	20,956	139,830	151,398	*	*	*	*	170,342	172,354
Sacramento.....	57,399	187,075	19,177	14,808	*	*	117,911	97,578	194,487	299,261
San Bernardino.....					*	*	21,999	27,309	21,999	27,309
San Diego.....			15,731	13,861	48,044	43,245			63,775	57,106
San Mateo.....					*	*	29,000	20,000	76,546	75,880
Santa Clara.....	41,357	41,357			6,189	5,523	151,824	138,721	151,824	138,721
Shasta.....	b 411,4274	75,600	26,456	25,663			11,103	2,651	61,612	35,224
Sierra.....	61,612	35,224							167,386	72,350
Siskiyou.....	e167,386	72,350	*	*	*	*	*	*	4,706	3,100
Sonoma.....	4,706	3,100					3,454	3,680	57,330	47,787
Tehama.....	53,576	44,107					*	*	83,704	101,662
Tuolumne.....	82,535	100,172	869	1,490	33,590	24,214	*	*	54,135	38,221
Venture.....	20,245	14,007							888,522	427,662
Fresno, Glenn, San Benito, San Luis Obispo ^b , Santa Clara, Santa Cruz ^a	888,522	427,662	75,590	108,065					78,590	108,065
Napa, San Bernardino, San Mateo, Sonoma ^a										
Contra Costa, El Dorado, Fresno, Glenn, Marin, Merced, Riverside, Sacramento, San Benito, San Bernardino, San Francisco, Santa Clara, Santa Cruz, Sonoma, Tulare ^a					177,191	186,064			177,191	186,064
Calaveras, Fresno, Modoc, Merced, Nevada, Orange ^b , Calaveras, San Benito, San Francisco, San Joaquin, Santa Cruz, Solano, Sonoma, Tulare, Tuolumne, Ventura, Yuba ^a							344,812	340,220	344,812	340,220
Totals.....	2,471,917	\$1,774,894	1,212,223	\$1,437,791	622,426	\$566,544	11,644,984	\$6,464,478	15,051,550	\$10,243,707

^a Combined to conceal output of a single operator in each.

^a Includes slag.

^b Includes decomposed granite.

^a Includes slag.

^b Includes volcanic cinder.

Miscellaneous Stone Production of California, by Years.

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

Crushed Rock, Sand and Gravel, by Years

Year	Tons	Value	Year	Tons	Value
1893.....	371,000	\$456,075	1916.....	9,951,089	\$4,009,590
1894.....	661,900	664,838	1917.....	8,069,271	3,505,662
1895.....	1,254,688	1,095,939	1918.....	6,641,144	3,325,889
1896.....	960,619	839,884	1919.....	6,919,188	3,678,322
1897.....	821,123	600,112	1920.....	9,792,122	6,782,414
1898.....	1,177,365	814,477	1921.....	10,914,145	7,834,640
1899.....	964,898	786,892	1922.....	13,049,644	10,366,231
1900.....	789,287	561,642	1923.....	19,840,301	15,379,838
1901.....	530,396	641,037	1924.....	21,451,129	15,962,476
1902.....	2,056,015	1,249,529	1925.....	23,819,137	17,407,113
1903.....	2,215,625	1,673,591	1926.....	24,987,606	19,859,261
1904.....	2,296,898	1,641,877	1927.....	25,126,691	18,912,994
1905.....	2,624,257	1,716,770	1928.....	27,471,794	17,328,044
1906.....	1,555,372	1,418,406	1929.....	27,104,618	17,840,159
1907.....	2,288,888	1,915,015	1930.....	23,514,168	16,430,027
1908.....	3,998,945	3,241,774	1931.....	15,848,313	11,848,531
1909.....	5,531,561	2,708,326	1932.....	11,361,564	7,183,643
1910.....	5,827,828	2,777,690	1933.....	11,181,156	6,871,581
1911.....	6,487,223	3,610,357	1934.....	16,148,275	7,131,330
1912.....	8,044,937	4,532,598	1935.....	9,041,876	5,571,041
1913.....	9,817,616	4,823,056	1936.....	28,528,079	16,578,238
1914.....	9,288,397	3,969,973	1937.....	28,254,740	16,917,683
1915.....	10,879,497	4,609,278			
			Totals.....	439,460,485	\$297,064,843

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business was coincident with the rapid development of the cement industry from the year 1902.

INDUSTRIAL MATERIALS

CHAPTER FIVE

Bibliography: State Mineralogist Reports XII-XXXIII (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have a clearly defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

In 1937 the mineral zircon was added to this group. The material mined was used as an abrasive and a refractory.

This group, as a whole, showed an increase in total value from \$5,236,534 in 1936 to \$6,154,918 in 1937.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1936 and 1937.

Substance	1936		1937		Increase + Decrease— Value
	Amount	Value	Amount	Value	
Bentonite.....	10,185 tons	\$165,131	8,425 tons	\$140,261	\$24,870—
Clay (pottery).....	382,823 tons	646,920	354,669 tons	705,200	58,280—
Dolomite.....			12,371 tons	24,603	* —
Feldspar.....	3,430 tons	24,959	2,686 tons	10,930	14,029—
Gems.....		2,878		2,075	803—
Gypsum.....	143,549 tons	282,703	186,160 tons	384,431	101,728+
Limestone.....	295,792 tons	661,757	351,755 tons	830,562	168,805+
Mineral Water.....	19,348,513 gals.	777,899	18,309,729 gals.	1,130,810	352,911+
Pumice and volcanic ash.....	17,132 tons	143,709	10,392 tons	79,005	64,704—
Silica (glass, sand, quartz).....	77,830 tons	310,278	84,313 tons	348,987	38,709+
Talc and soapstone.....	25,643 tons	309,287	29,657 tons	347,772	38,485+
Unapportioned.....		*1,911,013		†2,155,282	244,260+
Total values.....		\$5,236,534		\$6,159,918	
Net increase.....					\$923,384+

* Included under 'Unapportioned.'

† Includes barite, carbon dioxide, diatomite, dolomite, mica, mineral paint, pyrite, sillimanite-andalusite-cyanite group, sulphur.

‡ Includes barite, carbon dioxide, diatomite, fluorite, mica, mineral paint, pyrite, sillimanite-andalusite-cyanite group, sulphur, zircon.

ASBESTOS

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXII, XXVII (inc.), XXIX, XXXI-XXXII. Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531-533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617-625, 670-677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1937 there was no asbestos reported produced in California. In 1934 there was a small output of this material coming from a property in Napa County, and was used in roofing and plaster. The 1934 annual figures are combined under the 'Unapportioned' item to conceal the output of a single operator.

Asbestos Production of California, by Years.

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

Year	Tons	Value	Year	Tons	Value
1887	30	\$1,800	1912	90	\$2,700
1888	30	1,800	1913	47	1,175
1889	30	1,800	1914	51	1,530
1890	71	4,260	1915	143	2,860
1891	66	3,960	1916	145	2,380
1892	30	1,830	1917	136	10,225
1893	50	2,500	1918	229	9,903
1894	50	2,250	1919	131	6,240
1895	25	1,000	1920	410	19,275
1896			1921	50	1,800
1897			1922	20	200
1898	10	200	1923	70	4,750
1899	30	750	1924	25	1,650
1900	50	1,250	1925	13	1,160
1901	110	4,400	1926	219	6,175
1902			1927		
1903			1928		
1904	10	162	1929		
1905	112	2,625	1930		
1906	70	3,500	1931		
1907	70	3,500	1932	309	3,274
1908	70	6,100	1934		
1909	65	6,500	1935		
1910	200	20,000	1936		
1911	125	500			
			Totals	3,392	\$145,984

* Annual details concealed under 'Unapportioned.'

BARITE

Bibliography: State Mineralogist Reports XXII, XIV, XV, XVII, XXI-XXVIII (inc.). Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319-324, Feb. 17, 1923. U. S. Bureau of Mines, Inform. Circ. 6221, 6223.

During 1937 the barite produced in California came from two properties in Mariposa County, the annual details being concealed in the 'Unapportioned' item so as not to reveal the output of either operator. This material was consumed in the manufacture of lithopone, in heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

Commercial production of barite in California for 1936 and 1937 amounted to a total of 41,882 short tons valued at \$245,393 f.o.b. rail shipping point.

The Tariff Act of 1930 placed a duty on foreign imported barite ore, crude or unmanufactured, of \$4 per ton; ground or otherwise manufactured, of \$7.50 per ton.

Present quotations for barite (93% BaSO₄) vary from \$6 to \$7 (California \$7) per ton, crude, f.o.b. rail-shipping point. Most barite has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta, Santa Barbara and Tulare counties. The deposit at El Portal, in Mariposa County, has given the largest commercial production to date, in part witherite (barium carbonate, BaCO₃). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit.

Total Barite Production of California.

The first recorded production of barite in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

Year	Tons	Value	Year	Tons	Value
1910	860	\$5,640	1924		
1911	309	2,207	1925		
1912	564	2,812	1926	4,978	\$38,165
1913	1,600	3,680	1927	17,993	90,617
1914	2,000	3,000	1928	13,406	55,888
1915	410	620	1929	26,796	168,829
1916	1,606	5,516	1930	19,783	133,107
1917	4,420	25,633	1931	27,832	156,647
1918	100	1,500	1932	8,507	49,409
1919	1,501	18,065	1933	8,405	49,595
1920	3,029	20,795	1934	21,769	125,514
1921	901	4,809	1935	22,979	133,810
1922	3,370	18,925	1936)*	41,882	245,392
1923	2,925	16,058	1937)		
			Totals	237,925	\$1,376,243

* Annual details concealed under 'Unapportioned.'

BENTONITE (Fuller's Earth)

Bibliography: State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV-XXVI (inc.). Bulletins 38, 91. U. S. Bureau of Mines, Bulletin 71. Eng. & Min. Jour.-Press, Vol. 121, pp. 837-842, May 22, 1926.

During 1937 there was produced and shipped in California, 8,425 short tons of bentonite (fuller's earth) valued at \$140,261, coming from six properties—four in San Bernardino and one each in Inyo, and San Benito counties. The 1937 output, as compared with that of 1936 showed a decrease in amount and value, which was 10,185 tons, worth \$165,131.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is employed in uses that can not be classed as 'fuller's earth and therefore had been classified in these reports under pottery clay. This was somewhat confusing. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthy, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

The Tariff Act of June 21, 1930, placed a duty of \$1.50 a ton on foreign produced imported fuller's earth.

Bentonite Production of California, by Years.

Bentonite including a small amount of fuller's earth was first produced commercially in this State in 1899, and the total amount and value of the output since that time are as follows:

Year	Tons	Value	Year	Tons	Value
1899.....	620	\$12,400	1919.....	385	\$3,810
1900.....	500	3,750	1920.....	600	6,000
1901.....	1,000	19,500	1921.....	1,185	8,295
1902.....	987	19,246	1922.....	6,606	48,756
1903.....	250	4,750	1923.....	3,650	55,125
1904.....	500	9,500	1924.....	5,290	67,295
1905.....	1,344	38,000	1925.....	5,280	91,842
1906.....	440	10,500	1926.....	23,552	250,192
1907.....	100	1,000	1927.....	13,018	154,764
1908.....	50	1,000	1928.....	53,232	501,743
1909.....	459	7,385	1929.....	15,541	170,563
1910.....	340	3,820	1930.....	12,522	177,964
1911.....	466	5,294	1931.....	13,960	222,583
1912.....	876	6,500	1932.....	4,295	57,670
1913.....	460	3,700	1933.....	4,605	60,621
1914.....	760	5,928	1934.....	6,168	69,325
1915.....	692	4,002	1935.....	10,204	68,372
1916.....	110	550	1936.....	10,185	165,131
1917.....	220	2,180	1937.....	8,425	140,261
1918.....	37	333			
			Totals.....	192,013	\$1,815,561

CALCIUM SILICATE

Bibliography: Mining and Metallurgy: Oct., 1935.

During 1936 there were no commercial shipments of calcium silicate reported in California. In 1934 there was production coming from a single property in Kern County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of the single operator.

The first commercial production of wollastonite was made in 1933 from a deposit operated by John T. Thorndyke in the Radamacher District in Kern County, and was shipped from Code's Siding to Los Angeles, where it is used to manufacture mineral wool. This was done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. Mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass.

Pyroxene is a silicate of calcium and magnesium and is found in crystalline limestones near the contact with intrusive igneous rocks and in basic igneous rocks such as gabbros. It is white to various shades of green, brown to black, having a hardness of 5 to 6 and a specific gravity 3.2 to 3.6.

Wollastonite is a calcium metasilicate (CaSiO_3) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of $4\frac{1}{2}$ to 5 and a specific gravity of about 2.9.

Calcium silicate from 1934 to 1936 was classed in California mineral production reports as wollastonite.

CARBON DIOXIDE GAS

Bibliography: State Mineralogist Report XII.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells. The 1937 figures are combined under the 'Unapportioned' item to conceal the output of a single producer.

Carbon Dioxide Gas Production in California, by Years

Year	M cubic feet	Value
1894	80	\$4,072
1895	800	12,000
1896	81	1,300
1897		
1933		
1934 *	15,440	1,822
1935		
1936 *	89,777	64,787
1937		
Totals	106,178	\$83,981

* Annual details concealed under 'Unapportioned.'

CLAY (Pottery)

Bibliography: State Mineralogist Reports I, IV, IX, XII-XV, XVIII-XXVIII (inc.), XXX-XXXIII (inc.). Bulletins 38, 99. Preliminary Report No. 7. U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-four of its counties. Of these 21 contributed in 1937. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods,

and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.



Porcelain Fountain in State Fair Grounds, made of California Clays

Photo by Walter W. Bradley

During 1937 there was a total of 61 properties in 21 counties which reported an output of 354,669 short tons of pottery clay valued at \$705,200 f.o.b. rail-shipping point for the crude material, as compared with 49 properties in 19 counties producing 382,823 tons, worth \$646,920 in 1936.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data sent in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

A tabulation of the direct returns from the producers, by counties, for the year 1937 is shown herewith:

Pottery Clay in 1937

County	Tons	Value	Used in the manufacture of
Alameda.....	5,506	\$9,412	Roofing, floor, and mantel tile; chimney, drain, and sewer pipe. Prepared clay and various.
Amador ^a	66,397	107,212	Architectural terra cotta; fire clay and refractories; chimney; drain and sewer pipe; floor, mantel, and roofing tile; art pottery; electrical porcelain; and various.
Kern ^b	42,628	130,482	Floor and fancy tile, sanitary ware, art pottery, China, and oil-well drilling-mud.
Los Angeles.....	17,828	15,083	Red earthenware; chimney, drain and sewer pipe; vents; floor, mantel, and roofing tile; art pottery; and various.
Orange.....	29,415	84,513	Architectural terra cotta; conduits and segment blocks; electrical, porcelain, and chinaware; refractories; vents; drain, floor, and mantel tile; art pottery; and various.
Placer.....	70,960	107,138	Architectural terra corra; chimney, drain and sewer pipe; faience; floor, mantel, and roofing tile; red earthenware; electrical porcelain; sanitary ware; and various.
Riverside.....	64,462	117,798	Conduit, sewer, and drain pipe; red earthenware; faience, floor, mantel, and roofing tile; and various.
San Bernardino.....	5,765	50,252	Roofing, floor and mantel tile; drain and sewer pipe; red earthenware; refractories; fire-sand and various.
Santa Clara.....	3,182	5,560	Sewer pipe; art pottery; drain, floor, mantel, and roofing tile; stoneware; and various.
Ventura ^b	8,927	6,425	Oil-well drilling-mud.
Calaveras, Contra Costa, Fresno, Humboldt, Imperial, Marin, San Diego, San Luis Obispo ^b , Sonoma, Stanislaus, Sutter ^a	39,599	71,025	Drain, roofing, and mantel tile; saggars; electrical porcelain; refractories; red earthenware, garden furniture; oil-well drilling-mud; sewer, drain, and conduit pipe; prepared clay, light weight aggregate; and various.
Totals.....	354,669	\$705,200	

^a Includes firesand.

^b Includes clay and shale used for oil-well drilling-mud.

* Combined to conceal the output of single operators in each.

POTTERY CLAY PRODUCTS

The value of the various pottery clay products made in California during 1937, totaled \$11,307,859, compared with \$9,886,209 in 1936. The distribution for 1937 is shown in the following tabulation:

Product	Number producers	Tons	Value
Architectural terra cotta, chimney pipe and fueling.	11	11,079	\$547,998
Drain pipe.	18	7,377	136,200
Roofing tile.	21	46,193	713,529
Floor, faience, mantel, and hand-made tile.	27		2,603,893
Sewer pipe.	10	60,498	1,475,083
Red earthenware.	6		148,112
Stoneware and chemical stoneware.	6		418,183
Electrical porcelain.	4		238,308
Conduit pipe.	4		140,777
Fire clay and high temperature cement.	7	13,472	142,857
Chinaware.	3		1,929,552
Sanitary ware and plumbing fixtures.	3		1,952,711
Art pottery.	4		79,861
Miscellaneous: chimney accessories, gas-stove radiants, porcelain shapes, gas-house tank-blocks, grog, molding clay, segment blocks and liners, vents, glass tank blocks and liners, light aggregate, glazed kitchenware, quarries, swimming-pool gutters, fire clay shapes, and specialties.	17		780,795
Total value.			\$11,307,859

All the above clay products in 1937 showed an increased total value with the exception of architectural terra cotta and red earthenware over that of the previous year.

Pottery Clay Production of California, by Years.

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

Year	Tons	Value	Year	Tons	Value
1887	75,000	\$37,500	1913	231,179	\$261,273
1888	75,000	37,500	1914	179,948	167,552
1889	75,000	37,500	1915	157,866	133,724
1890	100,000	50,000	1916	134,636	146,538
1891	100,000	50,000	1917	166,298	154,602
1892	100,000	50,000	1918	112,423	166,788
1893	24,856	67,284	1919	135,708	245,019
1894	28,475	35,073	1920	203,997	440,689
1895	37,660	39,685	1921	225,120	362,172
1896	41,907	62,900	1922	277,232	473,184
1897	24,592	30,290	1923	376,863	697,841
1898	28,947	33,747	1924	417,928	651,857
1899	40,600	42,700	1925	537,587	674,376
1900	59,636	60,956	1926	801,461	806,509
1901	55,679	39,144	1927	867,419	872,661
1902	67,933	74,163	1928	887,807	1,394,950
1903	90,972	99,907	1929	839,949	1,127,527
1904	84,149	81,952	1930	938,586	795,517
1905	133,805	130,146	1931	332,680	408,931
1906	167,267	162,283	1932	167,284	204,890
1907	160,385	254,454	1933	141,629	211,711
1908	208,042	325,147	1934	190,510	245,900
1909	296,424	465,647	1935	240,014	377,969
1910	249,028	324,099	1936	382,823	646,920
1911	224,576	252,759	1937	354,669	705,200
1912	199,605	215,683			
			Totals	12,054,154	\$15,434,819

DIATOMITE (Diatomaceous Earth)

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXVIII (inc.), XXXI, XXXIII. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, Aug. 1915, pp. 1539-1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2341, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152-1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weighs 18 to 20 pounds) and extremely porous, chalk-like material composed of pure silica (chalk, being calcareous) which has been laid down under water and consists of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The Santa Barbara material is diatomaceous and is of a superior quality, particularly for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Fresno, Kern, Los Angeles, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma and Tehama counties.

As about 70 per cent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were six operators during 1937 in Los Angeles, Monterey, and Santa Barbara counties. The shipments during the year showed an increase in total tonnage and value compared with 1936.

The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, fillers, abrasives and for clarification of gasoline and kerosene.

Total Production of Diatomite in California.

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Tons	Value	Year	Tons	Value
1889	39	\$1,335	1914	12,840	\$80,250
1890			1915	12,400	62,000
1891			1916	15,322	80,649
1892			1917	24,301	127,510
1893	50	2,000	1918	35,963	189,459
1894	51	2,040	1919	40,200	217,800
1895			1920	60,764	1,056,260
1896			1921		
1897	5	200	1922	*90,739	1,016,675
1898			1923		
1899			1924	*193,064	5,729,736
1900			1925		
1901			1926		
1902	422	2,532	1927	*275,403	1,995,923
1903	2,703	16,015	1928		
1904	6,950	112,282	1929		
1905	3,000	15,000	1930	*300,017	4,848,661
1906	2,430	14,400	1931		
1907	2,531	28,948	1932		
1908	2,950	32,012	1933	*203,228	3,104,154
1909	500	3,500	1934		
1910	1,843	17,617	1935		
1911	2,194	19,670	1936	*290,908	4,243,572
1912	4,129	17,074	1937		
1913	8,645	35,968	Totals	1,593,591	\$22,933,557

* Annual details concealed under 'Unapportioned.'

DOLOMITE

Bibliography: State Mineralogist Reports XV, XVII, XXVII, XXVIII, XXXI, XXXIII.

The 1937 output of dolomite in California amounted to 12,371 short tons valued at \$24,603. This came from four properties—one each in Inyo, Los Angeles, Monterey, and San Benito counties. The 1937 production showed a decrease in amount and value as compared with that of 1936, which was 25,807 tons, worth \$63,122.

The material shipped was utilized for steel-furnace flux and refractories, plaster, stucco dash-coat, terrazzo, art stone, for the manufacture of CO₂, and mineral wool.

Dolomite Production of California, by Years.

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

Year	Tons	Value	Year	Tons	Value
1915.....	4,192	\$14,504	1928.....	38,379	\$85,342
1916.....	13,313	46,566	1929.....	58,644	156,928
1917.....	27,911	66,416	1930)*.....	66,564	161,245
1918.....	24,560	79,441	1931.....		
1919.....	24,502	67,953	1932.....	35,275	40,956
1920.....	42,388	132,791	1933.....	54,456	176,575
1921.....	31,195	99,155	1934)*.....	108,645	304,984
1922.....	52,409	114,911	1935.....		
1923.....	69,519	142,615	1936.....	25,807	63,122
1924.....	28,843	71,271	1937.....	12,371	24,603
1925.....	42,852	104,900			
1926.....	68,640	119,313	Totals.....	976,441	\$2,153,033
1927.....	45,976	79,442			

* Annual details concealed under 'Unapportioned.'

FELDSPAR

Bibliography: State Mineralogist Reports XV, XVII-XXVIII (inc.), XXX, XXXI. Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Press, Vol. 115, pp. 535-538, Mar. 24, 1923.

The output of feldspar in California during 1937 amounted to 2,686 short tons valued at \$10,930 and came from two properties in San Diego County, and one in Fresno County. The 1937 production was a decrease in quantity and value as compared with that of 1936 which was 3,430 tons worth \$24,959.

Total Feldspar Production in California.

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

Year	Tons	Value	Year	Tons	Value
1910.....	760	\$5,720	1925.....	8,165	\$59,615
1911.....	740	4,560	1926.....	7,300	56,400
1912.....	1,382	6,180	1927.....	10,932	86,101
1913.....	2,129	7,850	1928.....	14,628	93,745
1914.....	3,530	16,565	1929.....	13,327	78,404
1915.....	1,800	9,000	1930.....	5,014	35,654
1916.....	2,630	14,350	1931.....	4,795	59,921
1917.....	11,792	46,411	1932.....	2,294	15,988
1918.....	4,132	22,061	1933.....		
1919.....	1,272	12,965	1934*.....	2,655	30,611
1920.....	4,518	26,189	1935.....	3,265	21,855
1921.....	4,349	28,343	1936.....	3,430	24,959
1922.....	4,587	37,109	1937.....	2,686	10,930
1923.....	11,100	81,800			
1924.....	9,055	68,112	Totals.....	143,267	\$961,393

* Annual details concealed under 'Unapportioned.'

FLUORSPAR

Bibliography: State Mineralogist Reports XVII, XVIII, XXIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489-492, Mar. 22, 1924.

The 1937 output of fluorspar in California came from a single property in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. This material was shipped to steel mills to be used as a flux. The combined production of 1933 and 1934 amounted to a total of 227 tons worth \$3,631.

Fluorspar, or calcium fluoride, CaF_2 , is one of the most important nonmetallic minerals from an industrial standpoint. About 80 per cent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

In California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917-1918, when a total of 79 tons valued at \$991 was shipped from Riverside County.

Present quotations (Metal and Mineral Markets) are: not less than 85 per cent CaF_2 and not over 5 per cent SiO_2 , \$18 to \$19 per ton; No. 2 lamp, \$21 per ton.

GEMS

Bibliography: State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI-XXVIII (inc.), XXX-XXXII (inc.). Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geo. Univ. of Cal., Vol. 5, pp. 149-153, 331-380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones

are gathered and marketed, for the most part in a small way. The gem material reported in California during 1937 had a total value of \$2,075. This output came from Imperial, Modoc, Napa, San Diego, Santa Clara, Siskiyou and Tulare counties and consisted of jasper, iceland spar, iridescent obsidian, rhodonite, californite, tourmaline, and onyx (chalcedony). The above showed a decrease as compared with that of 1936 which was worth \$2,878.

Total Production of Gem Materials in California.

The value of the gem output in California annually since the beginning of commercial production is as follows:

Year	Value	Year	Value
1900.....	\$20,500	1920.....	\$38,056
1901.....	40,000	1921.....	10,954
1902.....	162,100	1922.....	1,312
1903.....	110,500	1923.....	13,220
1904.....	136,000	1924.....	4,800
1905.....	148,500	1925.....	10,663
1906.....	497,090	1926.....	9,049
1907.....	232,642	1927.....	7,035
1908.....	208,950	1928.....	22,200
1909.....	193,700	1929.....	26,850
1910.....	237,475	1930.....	3,540
1911.....	51,824	1931.....	5,607
1912.....	23,050	1932.....	4,961
1913.....	13,740	1933.....	690
1914.....	3,970	1934.....	2,456
1915.....	3,565	1935.....	945
1916.....	4,752	1936.....	2,878
1917.....	3,049	1937.....	2,075
1918.....	650		
1919.....	5,425	Total.....	\$2,262,773

GRAPHITE

Bibliography: State Mineralogist Reports XIII, XIV, XV, XVII, XXVI (inc.), XXX, XXXIII. Bulletins 67, 91. U. S. G. S., Min. Res., 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite have been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. From 1931 to 1933 there was a small production of graphite from a property in Los Angeles County.

During 1937 no production of graphite was reported in California. In 1935 there was a small output of graphite coming from a single property in Los Angeles County. This material was used for experimental purposes. The annual details are concealed under the 'Unapportioned' item in order not to reveal the output of the single operator.

Graphite Production of California, by Years.

According to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:

Year	Pounds	Value	Year	Pounds	Value
1901.....	128,000	\$4,480	1923.....		
1902.....	84,000	1,680	1925.....		
1903.....			1926.....	*76,000	13,120
1913.....	2,500	25	1927.....		
1914.....			1928.....		
1915.....			1931.....		
1916.....	29,190	2,335	1932.....	*156,000	1,950
1917.....			1933.....		
1918.....			1934.....		
1919.....	*770,000	37,225	1935.....	*	*
1920.....			1936.....		
1921.....					
1922.....	*624,000	26,160	Totals.....	1,869,690	\$86,975

* Annual details concealed under 'Unapportioned,' on account of a single producer.

GYPSUM

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV-XXVIII (inc.), XXX, XXXI, XXXIII. Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

During 1937 there were shipments of gypsum in California amounting to 186,160 tons valued at \$384,431. This came from three properties in Fresno County, and one each in Imperial and Riverside counties. Shipments showed an increase in both amount and value over the 1936 output which was 143,549 tons worth \$282,703.

Total Production of Gypsum in California.

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

Year	Tons	Value	Year	Tons	Value
1887.....	2,700	\$27,000	1913.....	47,100	\$135,050
1888.....	2,500	25,000	1914.....	29,734	78,375
1889.....	3,000	30,000	1915.....	20,200	48,953
1890.....	3,000	30,000	1916.....	33,384	59,533
1891.....	2,000	20,000	1917.....	30,825	56,840
1892.....	2,000	20,000	1918.....	19,695	37,176
1893.....	1,620	14,280	1919.....	19,813	50,579
1894.....	2,446	24,584	1920.....	20,507	92,535
1895.....	5,158	51,014	1921.....	37,412	78,875
1896.....	1,310	12,580	1922.....	47,084	188,336
1897.....	2,200	19,250	1923.....	86,410	289,136
1898.....	3,100	23,600	1924.....	25,569	53,210
1899.....	3,663	14,950	1925.....	107,613	172,444
1900.....	2,522	10,088	1926.....	114,868	211,337
1901.....	3,875	38,750	1927.....	94,630	292,090
1902.....	10,200	53,500	1928.....	104,790	200,567
1903.....	6,914	46,441	1929.....	140,844	396,951
1904.....	8,350	56,592	1930.....	116,865	243,507
1905.....	12,859	54,500	1931.....	88,354	199,198
1906.....	21,000	69,000	1932.....	46,867	93,818
1907.....	8,900	57,700	1933.....	59,235	120,451
1908.....	34,600	155,400	1934.....	58,149	113,606
1909.....	30,700	138,176	1935.....	70,833	151,807
1910.....	45,294	129,152	1936.....	143,549	282,703
1911.....	31,457	101,475	1937.....	186,160	384,431
1912.....	37,529	117,388			
			Totals.....	2,039,376	\$5,371,928

LIMESTONE

Bibliography: State Mineralogist Reports IV, XII-XV (inc.), XVII-XXXI (inc.), XXXIII. Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249-253.

'Industrial' limestone was produced by 22 properties in nine counties in California during 1937 to the amount of 351,755 short tons valued at \$830,562, this being an increase in amount and value over the 1936 output, which was 295,792 tons worth \$661,757. The 1937 yield came from four properties each in El Dorado, San Bernardino, and Santa Clara counties; three each in Santa Cruz and Tuolumne counties; and one each in Fresno, Los Angeles, San Luis Obispo, and San Mateo counties.

The amount here given does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as a smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fertilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix. The material from Fresno County was marl; and that from Alameda, San Mateo and Santa Clara counties was shells, dredged from San Francisco Bay, which were ground and used for agricultural purposes and poultry grit. Of the total 'industrial' limestone produced in 1937 approximately 76,551 tons valued at \$277,430 was used for agricultural purposes and poultry grits.

Distribution of the 1937 output of limestone was as follows:

County	Tons	Value
El Dorado.....	227,721	\$448,130
San Bernardino.....	25,967	76,850
Santa Clara ^b	39,379	74,041
Santa Cruz.....	13,043	45,754
Fresno, ^a Los Angeles, San Luis Obispo, San Mateo, ^b and Tuolumne*.....	45,645	185,787
Totals.....	351,755	\$830,562

* Combined to conceal the output of individual operators in each.

^a Includes marl.

^b Includes shells.

Limestone Production of California, by Years.

The following tabulation gives the amounts and value of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and

sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included:

Year	Tons	Value	Year	Tons	Value
1894.....	15,420	\$19,275	1917.....	237,279	\$356,396
1895.....	71,355	71,690	1918.....	208,566	456,258
1896.....	68,184	71,112	1919.....	88,291	248,145
1897.....	36,796	38,556	1920.....	90,120	298,197
1898.....	27,686	24,548	1921.....	75,921	305,912
1899.....	30,769	29,185	1922.....	84,382	282,181
1900.....	32,791	31,532	1923.....	143,266	348,464
1901.....	76,937	99,445	1924.....	219,476	582,660
1902.....	71,422	90,524	1925.....	319,977	494,525
1903.....	125,919	163,988	1926.....	108,795	367,501
1904.....	40,207	87,207	1927.....	699,790	663,957
1905.....	192,749	323,325	1928.....	127,895	397,935
1906.....	80,262	162,827	1929.....	168,315	557,617
1907.....	230,985	406,041	1930.....	169,477	508,751
1908.....	273,890	297,264	1931.....	177,268	560,699
1909.....	337,676	419,921	1932.....	168,950	487,788
1910.....	684,635	581,208	1933.....	207,371	487,712
1911.....	516,398	452,790	1934.....	198,057	461,139
1912.....	613,375	570,248	1935.....	227,214	496,054
1913.....	301,918	274,455	1936.....	295,792	661,757
1914.....	572,272	517,713	1937.....	351,755	830,562
1915.....	146,324	156,288			
1916.....	187,521	217,733	Totals.....	9,102,448	\$14,950,085

LITHIA

Bibliography: State Mineralogist Reports II, IV, XIV, XXI, XXX. Bulletins 38, 67, 91.

Lithia mica, lepidolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929-1937 (inc.). During 1930 there was a small amount of lepidolite mined in California, but none shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia mica total production in the State has been as follows:

Year	Tons	Value	Year	Tons	Value
1899.....	124	\$4,600	1920.....	10,046	\$153,502
1900.....	440	11,000	1921.....		
1901.....	1,100	27,500	1922.....	*1,365	20,781
1902.....	822	31,880	1923.....		
1903.....	700	27,300	1924.....	109	2,269
1904.....	641	25,000	1925.....		
1905.....	25	276	1926.....		
1906.....			1927.....	*550	13,900
1915.....	91	1,365	1928.....		
1916.....	71	1,065	1929.....		
1917.....	880	8,800			
1918.....	4,111	73,998	Totals.....	21,875	\$417,636
1919.....	800	14,400			

* Annual details concealed under 'Unapportioned.'

MICA

Bibliography: State Mineralogist Reports II, IV, XXVI-XXVIII (inc.), XXX, XXXIII. Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55-60, Jan. 13, 1923.

Sericite, a fine-grained variety of muscovite, has been produced continuously since 1929 in California with the exception of 1934. The 1937 output of mica came from a single property each in Imperial and Mariposa counties, while that for 1936 came from a single property in Imperial, Kern, and Riverside counties. The annual details are concealed in the 'Unapportioned' item so as not to reveal production of the individual operator. The material mined during the year was sericite. Sericite is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow. A small amount of vermiculite, a hydrous mica, expanded by heating and then used as an insulating agent, was mined in 1936.

Production of mica in California has been as follows:

Year	Tons	Value	Year	Tons	Value
1902-----	50	\$2,500	1932)*-----	1,957	13,963
1903-----	50	3,800	1933)-----		
1904-----	50	3,000	1934)-----		
1929)-----			1935)*-----	3,833	15,650
1930)*-----	2,240	15,260	1936)-----	*	*
1931)-----			1937)-----		
			Totals-----	8,180	\$54,173

* Annual details concealed under 'Unapportioned.'

MINERAL PAINT

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXI, XXII-XXVIII (inc.). Bulletins 38, 91.

During 1937 there was a small amount of mineral paint produced in California, which came from a single property each in Nevada, Placer and Yuba counties. The details are concealed under 'Unapportioned' so as not to reveal individual output. The material from Nevada and Yuba counties was a limonite and that from Placer County a sienna.

These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity and Yuba counties, in which they are found.

Mineral Paint Production of California, by Years.

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith:

Year	Tons	Value	Year	Tons	Value
1890.....	40	\$480	1914.....	132	\$847
1891.....	22	880	1915.....	311	1,756
1892.....	25	750	1916.....	643	3,960
1893.....	590	26,795	1917.....	520	2,700
1894.....	610	14,140	1918.....	728	4,738
1895.....	750	8,425	1919.....	1,780	17,055
1896.....	395	5,540	1920.....	779	8,477
1897.....	578	8,165	1921.....	446	4,748
1898.....	653	9,698	1922.....	1,620	13,277
1899.....	1,704	20,294	1923.....	1,049	11,773
1900.....	529	3,993	1924.....	532	5,234
1901.....	325	875	1925.....	669	6,969
1902.....	589	1,533	1926.....	569	5,846
1903.....	2,370	3,720	1927*.....	919	9,592
1904.....	270	1,985	1928*.....		
1905.....	754	4,025	1929.....	467	2,820
1906.....	250	1,720	1930*.....	250	3,000
1907.....	250	1,720	1931*.....		
1908.....	335	2,250	1932.....		
1909.....	305	2,325	1933.....		
1910.....	200	2,040	1935*.....	570	5,550
1911.....	186	1,184	1936.....		
1912.....	300	1,800	1937.....		
1913.....	303	1,780			
			Totals.....	23,717	\$227,648

* Annual details concealed under 'Unapportioned.'

MINERAL WATER

Bibliography: State Mineralogist Reports VI, XII-XVIII (inc.), XXI-XXIX (inc.), XXXI, XXXIII (inc.). U. S. G. S., Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California,' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

The commercial production of mineral water during 1937 amounted to 18,309,729 gallons valued at \$1,130,810, as compared with 19,348,513 gallons valued at \$777,899 in 1936. The 1937 output came from springs on 38 properties in 17 counties, and was distributed as follows:

County	Gallons	Value
Lake.....	38,489	\$33,858
Los Angeles.....	8,615,029	750,512
Napa.....	77,531	15,683
Sonoma.....	70,788	6,838
Butte, Calaveras, Colusa, Contra Costa, El Dorado, Marin, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Siskiyou*.....	9,507,892	323,919
Totals.....	18,309,729	\$1,130,810

* Combined to conceal the output of operators in each.

The production above tabulated came either from springs or artesian wells, and was bottled, in part with artificial carbonation, but

mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors.



Steam Wells at The Geysers Hot Springs, Sonoma County.

Photo by Walter W. Bradley

Mineral Water Production of California, by Years.

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,¹ and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amounts and values, annually, since that year are shown herewith:

Year	Gallons	Value	Year	Gallons	Value
1887.....	618,162	\$144,368	1913.....	2,350,792	\$599,748
1888.....	1,112,202	252,990	1914.....	2,443,572	476,169
1889.....	808,625	252,241	1915.....	2,274,267	467,738
1890.....	258,722	89,786	1916.....	2,273,817	410,112
1891.....	334,553	139,959	1917.....	1,942,020	340,566
1892.....	331,875	162,019	1918.....	1,808,791	375,650
1893.....	383,179	90,667	1919.....	2,233,842	340,117
1894.....	402,275	184,481	1920.....	2,391,791	421,643
1895.....	701,397	291,500	1921.....	3,446,278	367,476
1896.....	808,843	337,434	1922.....	4,276,346	486,424
1897.....	1,508,192	345,863	1923.....	5,487,276	616,919
1898.....	1,429,809	213,817	1924.....	8,159,211	818,726
1899.....	1,338,537	406,691	1925.....	12,115,072	1,230,455
1900.....	2,456,115	268,607	1926.....	14,074,877	1,171,550
1901.....	1,555,328	559,057	1927.....	16,644,423	1,487,183
1902.....	1,701,142	612,477	1928.....	25,049,002	1,304,969
1903.....	2,056,340	558,201	1929.....	27,032,083	2,040,615
1904.....	2,430,320	496,946	1930.....	37,354,111	2,870,663
1905.....	2,194,150	538,700	1931.....	26,164,331	1,347,860
1906.....	1,585,690	478,186	1932.....	19,031,224	1,495,988
1907.....	2,924,269	544,016	1933.....	15,650,406	719,746
1908.....	2,789,715	560,507	1934.....	19,882,436	1,071,197
1909.....	2,449,834	465,488	1935.....	16,659,254	940,333
1910.....	2,335,259	522,009	1936.....	19,348,513	777,899
1911.....	2,637,669	590,654	1937.....	18,309,729	1,130,810
1912.....	2,497,794	529,384			
			Totals.....	346,053,460	\$33,036,603

¹ Cronise, T. F., The natural wealth of California, p. 182, 1868.

PHOSPHATES

Bibliography: State Mineralogist Report XXI. Bulletins 67, 91.

No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite, Li (AlF) PO_4 , have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia.

PUMICE and VOLCANIC ASH

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII-XXVIII (inc.), XXX-XXXII (inc.). Bulletin 38. U. S. Bureau of Mines I. G. 6560. (See 'Tufa'.)

The production of pumice and volcanic ash in California during the year 1937 amounted to 10,392 short tons, valued at \$79,005. This came from five properties in Siskiyou County, four in Inyo County, two each in Madera and Napa counties; and one each in Imperial, Kern, Mariposa, Mono, and San Luis Obispo counties. The 1937 figures showed a decrease in amount and value as compared with those of 1936 which were 17,132 tons worth \$143,709.

The material from three deposits in Inyo County, part from Madera, and that from Imperial, Mariposa, Mono, Napa, and Siskiyou counties, was 6,387 tons of lump pumice, which was used in acoustic plaster, light-weight aggregate in concrete, for abrasive purposes, and for chicken-house litter. The production part of one property in Madera County, one property in Inyo, and that in Kern and San Luis Obispo counties was 4,005 tons of volcanic ash, or tuff variety, and was employed in making soap, cleanser compounds, as a concrete filler in cement displacement, in asphalt, and as a carrier for dry agricultural sprays. The Kern County ash is going into the preparation of one of our popular and nationally advertised brands of cleanser compounds.

Pumice Production of California, by Years.

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not again until 1912, since which year there has been a small annual output, as indicated by the following table:

Year	Tons	Value	Year	Tons	Value
1909	50	\$500	1924	4,919	\$33,404
1910			1925	5,319	32,937
1911			1926	7,170	48,350
1912	100	2,500	1927	13,779	168,896
1913	3,590	4,500	1928	10,440	105,055
1914	50	1,000	1929	10,449	76,123
1915	380	6,400	1930	12,947	128,847
1916	1,246	18,092	1931	11,711	108,130
1917	525	5,295	1932	9,891	86,034
1918	2,114	28,669	1933	8,243	61,067
1919	2,388	43,657	1934	9,951	54,748
1920	1,537	25,890	1935	14,890	87,055
1921	406	6,310	1936	17,132	143,709
1922	613	4,248	1937	10,392	79,005
1923	2,936	16,309			
			Totals	153,168	\$1,376,730

PYRITES

Bibliography: State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI, XXX. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Pyrite, shipped in California during 1937 came from a single property in Shasta County. The 1937 production showed a decrease in both quantity and value from that of 1936. The annual details are placed under 'Unapportioned' to conceal the output of the individual operator.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been produced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

Pyrites Production in California, by Years.

The total recorded pyrites production in California to date is as follows:

Year	Tons	Value	Year	Tons	Value
1898	6,000	\$30,000	1919	147,024	\$540,300
1899	5,400	28,620	1920	146,001	530,581
1900	3,642	21,133	1921	110,025	473,735
1901	4,578	18,429	1922	151,381	570,425
1902	17,525	60,306	1923	148,004	555,308
1903	24,311	94,000	1924	124,214	517,835
1904	15,043	62,992	1925	129,500	528,050
1905	15,503	63,958	1926	100,896	466,088
1906	46,689	145,895	1927	130,910	564,823
1907	82,270	251,774	1928	90,566	400,627
1908	107,081	610,335	1929	79,169	363,717
1909	457,867	1,389,802	1930	39,958	194,228
1910	42,621	179,862	1931	25,402	131,174
1911	54,225	182,954	1932		
1912	69,872	203,470	1933 *	72,271	297,832
1913	79,000	218,537	1934 *		
1914	79,267	230,058	1935 *	157,129	547,754
1915	92,462	293,148	1936		
1916	120,525	372,969	1937 *	155,107	541,915
1917	111,325	323,704			
1918	128,329	425,012	Totals	3,370,092	\$12,431,900

* Annual details concealed under 'Unapportioned.'

SHALE OIL

Bibliography: State Mineralogist Report XIX. U. S. Geol. Surv., Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210, Eng. and Min. Jour.-Press, Vol. 118, No. 8, pp. 290-292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb., 1925. Min. Congress Jour., Dec., 1924.

Two plants on a more or less experimental scale operated for six years in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flota-

tion oil in metallurgical work, and part consumed as fuel at the plants. There has been no production reported since 1927.

Shale Oil Production of California, by Years

Year	Barrels	Value
1922)*	4,333	\$44,262
1923).....		
1924)*	8,688	55,240
1925).....		
1926)*	8,819	9,998
1927).....		
1928).....		
Totals.....	21,840	\$109,500

* Annual details concealed under 'Unapportioned.'

SILICA (Sand and Quartz)

Bibliography: State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX-XXVIII (inc.), XXXI-XXXIII (inc.). Bulletins 38, 67, 91.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass making and as an abrasive, and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as: quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

The production of silica in California during 1937 amounted to 84,313 short tons valued at \$348,987 f.o.b. rail shipping point, and came from two properties in Contra Costa County and one each in Monterey, Riverside, and San Diego counties. The above was an increase in both amount and value over the output of 1936 which was 77,830 tons worth \$310,278. The 1937 output consisted of 83,567 tons of glass sand and 746 tons of vein or boulder quartz.

The glass sand came from Contra Costa, Monterey and Riverside counties. For making the higher grades of glass, deposits in Contra Costa County are replacing the sand imported from Belgium. Belgium sand has displaced local material in the manufacture of sodium silicate ('water glass'). There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class color-

less glass; for such, it must be essentially iron-free. Even a fractional per cent of iron imparts a green color to the glass.

The Tariff Act of June 21, 1930, placed a duty on sand, containing 95 per cent or more of *Silica* and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass, of \$2 per ton.

Total Silica Production in California.

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

Year	Tons	Value	Year	Tons	Value
1899	3,000	\$3,500	1919	18,659	\$101,600
1900	2,200	2,200	1920	25,324	96,793
1901	5,000	16,250	1921	10,569	49,179
1902	4,500	12,225	1922	9,874	31,016
1903	7,725	7,525	1923	7,964	30,420
1904	10,004	12,276	1924	6,808	35,006
1905	9,257	8,121	1925	12,498	96,780
1906	9,750	13,375	1926	20,010	104,317
1907	11,065	8,178	1927	24,636	94,762
1908	9,255	22,045	1928	14,814	66,679
1909	12,259	25,517	1929	18,686	79,210
1910	19,224	18,265	1930	17,802	71,380
1911	8,620	8,672	1931	43,330	182,769
1912	13,075	15,404	1932	33,997	136,324
1913	18,618	21,899	1933	70,329	266,520
1914	28,538	22,688	1934	70,432	296,643
1915	28,904	34,322	1935	70,835	297,272
1916	20,880	48,908	1936	77,830	310,278
1917	19,376	41,166	1937	84,313	348,987
1918	23,257	88,930			
			Totals	913,217	\$3,116,401

SILLIMANITE-ANDALUSITE-KYANITE GROUP

Bibliography: State Mineralogist Reports XX, XXIII, XXIV, XXVII. Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press. Vol. 120, pp. 91-94, 1925. Amer. Mineralogist, June, 1924.

Sillimanite and andalusite are both aluminum silicates (Al_2SiO_5), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombic system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Kyanite is also an aluminum silicate (Al_2SiO_5), of the same chemical composition as andalusite and sillimanite, but crystallizing in the triclinic system. A deposit of kyanite is being mined in Imperial

County, near Ogilby, by the Vitrefrax Corporation and shipments made to their refractory plant in Los Angeles.

Dumortierite, though different somewhat in composition from the above, being a basic aluminum silicate ($\text{HAl}_3\text{BSi}_3\text{O}_{20}$), has proved similar in behavior in ceramic work so that it is now being mixed with andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.

Total Sillimanite Group Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1922)			1931)		
1923)*-----	4,584	\$98,790	1932)*-----	1,244	\$21,800
1924)			1933)		
1925)			1934)*-----	3,035	69,026
1926)*-----	4,810	203,000	1935)		
1927)			1936)*-----	3,112	89,214
1928)*-----	4,276	76,000	1937)		
1929)			Totals-----	25,420	\$756,723
1930)*-----	4,359	198,893			

* Annual details concealed under 'Unapportioned.'

SOAPSTONE and TALC

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII-XXVII (inc.), XXX, XXXIII. Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total output of talc and soapstone in California during 1937 amounted to 29,657 short tons valued at \$347,772. This was an increase in both quantity and value over the 1936 figures, which were 25,643 tons valued at \$309,287. Of the 1937 production, 28,202 tons were high-grade talc from Inyo and San Bernardino counties, which material was utilized mainly in toilet powders, paint, paper, for rubber manufacture, and some in ceramics. The remainder of 1,455 tons was soapstone and came from Butte, El Dorado, and Los Angeles counties.

The 'soapstone' grades were used mainly for roofing granules and as a filler in roofing paper and part also in magnesite cement.

It is reported that California talc has replaced to some extent imported talc in the toilet trade on the basis of quality. The largest production of talc in the United States comes from Vermont and New York and of massive soapstone from Virginia.

During 1937 imports of talc steatite, etc., totaled 26,876 short tons valued at \$472,819, as compared with 24,520 tons worth \$456,667 during 1936, according to the United States Bureau of Foreign and Domestic Commerce.

The Tariff Act of 1930 places a duty on talc, steatite or soapstone and French chalk, crude or unground, of one-fourth of one cent per pound.

Talc Production of California, by Years.

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

Year	Tons	Value	Year	Tons	Value
1893.....	400	\$17,750	1916.....	1,703	\$9,831
1894.....			1917.....	5,267	45,279
1895.....	25	375	1918.....	11,760	85,534
1896.....			1919.....	8,764	115,091
1897.....			1920.....	11,327	221,362
1898.....			1921.....	8,752	130,078
1899.....			1922.....	13,378	197,186
1900.....			1923.....	17,439	252,661
1901.....	10	119	1924.....	16,179	242,770
1902.....	14	288	1925.....	15,465	239,084
1903.....	219	10,124	1926.....	17,004	255,645
1904.....	228	2,315	1927.....	16,218	164,744
1905.....	300	3,000	1928.....	18,668	251,372
1906.....			1929.....	18,676	193,493
1907.....			1930.....	15,861	154,258
1908.....	3	48	1931.....	13,472	109,940
1909.....	33	280	1932.....	10,690	122,880
1910.....	740	7,260	1933.....	14,451	153,668
1911.....			1934.....	13,920	158,606
1912.....	1,750	7,350	1935.....	17,332	170,830
1913.....	1,350	6,150	1936.....	25,943	309,287
1914.....	1,000	4,500	1937.....	29,657	347,772
1915.....	1,663	14,750			
			Totals.....	329,361	\$4,104,680

STRONTIUM

Bibliography: State Mineralogist Report XXVI, XXVII, Bulletins 67, 91. U. S. G. S. Bull. 540; 660-I.

There has been no production of strontium minerals in California since 1918, though in that year both celestite (SrSO_4), and the carbonate, strontianite (SrCO_3) were shipped. The first recorded commercial output of strontium minerals in California was in 1916. The occurrence of the carbonate is particularly interesting and valuable, as it appears to be the only considerable deposit of commercial importance so far opened up in the United States. Shipments reported as averaging 80% SrCO_3 have been made. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

Production of strontium minerals in California, by years, has been as follows:

Year	Tons	Value	Year	Tons	Value
1916.....	57	\$2,850	1919.....		
1917.....	3,050	37,000			
1918.....	2,900	33,000	Totals.....	6,007	\$72,850

SULPHUR

Bibliography: State Mineralogist Reports IV, XIII, XIV, XXV. Bulletins 38, 67, 91.

During 1937 there were two producers of sulphur in California, the material coming from Inyo County. The annual details are con-

cealed in the 'Unapportioned' item so as not to reveal the output of either operator. For the two years, 1935-1936, the production totaled 5,308 short tons valued at \$61,603. The 1937 output of sulphur was an increase over that of 1936 in amount and value.

The 1929-1931 output, which came from Colusa County, was utilized in the manufacture of a fertilizer and for dusting for mildew. The last previous production was in 1923 and 1924 and came from Kern County. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

Total Production of Sulphur in California.

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865-1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Production of sulphur in California to date:

Year	Tons	Value	Year	Tons	Value
1865			1932)*	1,991	\$32,838
1866)*	941	\$53,500	1933)		
1867)-----			1934)-----	4,412	67,656
1868 to 1922)-----			1935)*	5,308	61,603
1923)*	185	4,071	1936)*	*	*
1924)-----			1937)-----		
1925 to 1928)-----			Totals)-----	13,102	\$228,693
1929)					
1930)*	265	9,025			
1931)-----					

* Annual details concealed under 'Unapportioned.'

CHAPTER SIX

SALINES

Bibliography: State Mineralogist Reports III, XIV, XV, XVII-XXIX (inc.), XXXIII. Bulletin 24. Spurr and Wormser, "Marketing of Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromine, and in 1931 by iodine. The nitrates are still prospective.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The total value of this group showed an increase from \$12,416,349 in 1936 to \$13,216,270 in 1937. The following table gives details for each year:

Substance	1936		1937		Increase + Decrease— Value
	Amount	Value	Amount	Value	
Borates.....	313,389 tons	\$5,911,093	326,099 tons	\$6,206,619	\$295,526+
Magnesium salts.....	3,798 tons	347,838	3,867 tons	316,669	31,169—
Salt.....	398,249 tons	1,227,505	370,431 tons	1,043,611	183,180—
Soda.....	144,314 tons	1,412,788	153,685 tons	1,461,057	48,269+
Unapportioned.....		*3,517,125		*4,187,600	670,475+
Total values.....		\$12,416,349		\$13,216,270	
Net increase.....					\$799,921

* Includes bromine, calcium chloride, iodine and potash.

BORATES

Bibliography: State Mineralogist Reports III, X, XII-XV (inc.), XVII-XXIX (inc.), XXV-XXVII (inc.), XXXIII. Bulletins 24, 67, 91.

During 1937 there was produced in California a total of 346,587 tons of borate materials compared with 319,658 tons for the year 1936. The material shipped during the year included the new sodium borates, kernite (rasorite), kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County.

As the crude ore is not sold as such, but is almost entirely calcined before shipping to the refinery for conversion into the borax of commerce, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent, A. B. A. This is approximately the average A. B. A. content of colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated as above, the 1937 production totaled 326,099 tons valued at \$6,206,619. This was an increase both in quantity and value over the 1936 output, which was 313,389 tons worth \$5,911,093. The

total amount of borates exported from the United States¹ during the year 1937 was 153,772 tons valued at \$4,708,691, as compared with 102,021 tons worth \$3,119,850 in 1936.

Total Production of Borate Materials in California.

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864-1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer. California is also the premier world source, today.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revolutionized by the discovery of the colemanite beds at Calico, in San Bernardino County and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate, near Kramer in Kern County. The brines of Searles Lake are also an important source.

The total production of borate materials in California is shown in the following table:

Total Production of Borate Materials in California

Year	Tons	Value	Year	Tons	Value
1864	12	\$9,478	1902	117,202	\$2,234,994
1865	126	94,099	1903	34,430	661,400
1866	201	132,538	1904	45,647	698,810
1867	220	156,137	1905	46,334	1,019,158
1868	32	22,384	1906	58,173	1,182,410
1869			1907	53,413	1,200,913
1870			1908	22,200	1,117,000
1871			1909	16,828	1,163,960
1872	140	89,600	1910	16,828	1,177,960
1873	515	255,440	1911	50,945	1,456,672
1874	915	259,427	1912	42,135	1,122,713
1875	1,168	289,080	1913	58,051	1,491,530
1876	1,437	312,537	1914	62,500	1,483,500
1877	993	193,705	1915	67,004	1,663,521
1878	373	66,257	1916	103,523	2,409,375
1879	364	65,443	1917	109,944	2,561,958
1880	609	149,245	1918	88,772	1,867,908
1881	690	189,750	1919	66,791	1,717,192
1882	732	201,300	1920	127,065	2,794,206
1883	900	265,500	1921	50,136	1,096,326
1884	1,019	198,705	1922	39,087	1,068,025
1885	942	155,430	1923	62,667	1,893,798
1886	1,285	173,475	1924	52,070	1,599,149
1887	1,015	116,689	1925	46,124	1,526,938
1888	1,405	196,636	1926	47,605	1,625,298
1889	965	145,473	1927	72,462	3,043,260
1890	3,201	480,152	1928	109,722	3,378,552
1891	4,267	640,000	1929	144,678	3,312,085
1892	5,525	838,787	1930	209,869	3,686,817
1893	3,955	593,292	1931	206,405	5,753,037
1894	5,770	807,807	1932	179,356	2,856,470
1895	5,959	595,900	1933	197,495	3,019,513
1896	6,754	675,400	1934	240,696	5,524,262
1897	8,000	1,080,000	1935	280,249	4,602,064
1898	8,300	1,153,000	1936	313,389	5,911,093
1899	20,357	1,139,882	1937	326,099	6,206,619
1900	25,837	1,013,251			
1901	22,221	982,380			
			Totals	3,801,898	\$98,866,665

¹ Refined borax, ² Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

¹ Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Dec., 1937, Part 1.

BROMINE

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County. The 1937 output showed an increased value and amount as compared with 1936 production; annual details of which are concealed under the 'Unapportioned' item so as not to reveal the production of the single company which operated both plants.

The total commercial production of bromine in California is as follows:

Year	Tons	Value	Year	Tons	Value
1926)			1932)		
1927) *	158	\$120,480	1933) *	559	\$146,547
1928) -----			1934) -----		
1929) -----			1935) *	805	191,465
1930) *	802	552,933	1936) -----	*	*
1931) -----			1937) -----		
			Totals -----	2,324	\$1,011,425

*Annual details concealed under 'Unapportioned.'

CALCIUM CHLORIDE

Bibliography: U. S. Geol. Surv., Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hygroscopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent. During 1937 the production of calcium chloride in California came from two plants in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. The 1937 output showed an increase in both amount and value as compared with that of 1936.

Total Calcium Chloride Production in California.

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1921) -----	683	\$22,980	1930) *		
1922) *	1,204	26,580	1931) -----	9,688	\$103,237
1923) -----			1932) *	3,103	15,500
1924) *	10,988	328,876	1933) -----		
1925) -----			1934) *	4,048	16,196
1926) *	34,195	508,748	1935) -----		
1927) -----			1936) *	7,227	35,073
1928) *	12,020	114,080	1937) -----		
1929) -----			Totals -----	83,156	\$1,171,270

* Annual details concealed under 'Unapportioned.'

IODINE

Bibliography: U. S. Bureau of Mines I. C. 6387.

In 1936 the output of iodine in California came from two plants in Los Angeles County and showed an increase in both quantity and value over 1935. The annual details for 1936 are concealed under the 'Unapportioned' item to conceal the output of either operator. The combined 1935-1936 production came from three plants in Los Angeles County, and amounted to 487,401 pounds, valued at \$379,702.

Total Iodine Production in California.

Iodine as first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after the armistice the demand for these minerals decreased so that the plant in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters of certain deep oil wells in the Long Beach field. During 1933 two more plants started operation, making a total of three producing plants in the State.

Year	Pounds	Value
1929) *		
1931) -----	696,297	\$1,374,311
1933) -----		
1934) -----	355,279	423,016
1935) *	487,401	379,702
1937) *	*	*
1937 -----		
Totals -----	1,538,977	\$2,177,029

* Annual details concealed under 'Unapportioned.'

MAGNESIUM SALTS

Bibliography: State Mineralogist Reports XX, XXI, XXV-XXVI (inc.). Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

During 1937 there was an output of magnesium salts in California coming from one plant in San Diego County, and two in San Mateo County. This amounted to 3,867 short tons valued at \$316,669, and consisted of the chloride and carbonate. The 1936 output amounted to 3,798 tons worth \$347,838, which was also the chloride and the carbonate. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, a bulky white powder, was used as a heat-insulating material, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate marketed in past years was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitterns from the salt plants and was in part marketed in the liquid form carrying from 35% to 67% $MgCl_2$ and in part as dry crystals, while that from San Mateo County was magnesium carbonate.

The average value reported for the chloride produced in California in 1937 was approximately \$29.69 per ton, f.o.b. plant.

Total Production of Magnesium Salts in California.

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' has also been made, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1916.....	851	\$6,407	1929 ¹ *	4,914	\$333,906
1917.....	1,064	34,973	1930 ¹		
1918.....	1,008	29,955	1931 ¹ *	2,749	217,979
1919.....	1,616	82,457	1932 ¹	2,073	159,660
1920.....	3,150	107,787	1933.....	2,325	194,642
1921.....	4,153	106,140	1934.....	2,785	235,531
1922.....	3,036	89,788	1935.....	3,798	347,838
1923.....	3,662	116,031	1936.....	3,867	316,669
1924.....	4,823	145,883	1937.....		
1925.....	4,221	132,553	Total.....	61,217	\$2,922,258
1926.....	4,881	124,470			
1927 ¹ *	6,241	139,589			
1928 ¹					

* Annual details concealed under 'Unapportioned.'

NITRATES

Bibliography: State Mineralogist Reports XV, XXV, XXVI, XXVII. Bulletins 24, 67, 91. U. S. G. S., Press Bulletin No. 373, July, 1918. Smithsonian Inst., Publ. No. 2421, 1916.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State, but no deposit of commercial value has been developed as yet. It is hoped that a closer search may some day be rewarded by workable discoveries. At present the principal commercial source of nitrates is the Chilean saltpeter (sodium nitrate) deposits in South America.

The fixation of atmospheric nitrogen electrically has been accomplished successfully in Germany and Scandinavia. The possibilities of cheap hydroelectric power in California make the subject one of interest to us, as we have also the natural raw materials and chemicals to go with the power. Sodium and potassium cyanides can be made by fixation of atmospheric nitrogen electrically.

POTASH

Bibliography: State Mineralogist Reports XV, XVIII, XX, XXII, XXV-XXVII (inc.). Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1937 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed

under the 'Unapportioned' item. This was principally chloride and the product averaged 60% equivalent K_2O content. The material was sold mainly for fertilizer manufacture.

Imports of crude potash minerals and salts in the United States during 1937 according to the U. S. Bureau of Foreign and Domestic Commerce amounted to 701,472 long tons, valued at \$16,794,981, compared with 422,956 long tons worth \$9,990,250 in 1936. These materials consisted mainly of 'manure salts,' crude chloride (muriate) and sulphate, and kainite, all of which are admitted duty free.

Quotations have recently ranged from \$36.25 per ton c.i.f. Atlantic and Gulf ports for high grade sulphate (90%-95%), and \$16.50 for manure salts (30%).

Total Production of Potash in California.

Potash production began commercially in California in 1914, with a small yield from kelp. Practically all of the output now comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitterns, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and values of these potash materials, since their beginning in California in 1914, have been as follows:

Year	Tons	Value	Year	Tons	Value
1914.....	10	\$460	1927.....	67,340	\$1,952,852
1915.....	1,076	19,391	1928.....	178,680	5,522,350
1916.....	17,808	663,605	1929.....	172,263	5,500,536
1917.....	129,022	4,202,889	1930.....	153,147	3,932,721
1918.....	49,381	6,808,976	1931.....	355,604	3,750,809
1919.....	28,118	2,415,963	1932.....	358,417	6,988,922
1920.....	26,298	1,465,463	1933.....		
1921.....	14,806	390,210	1934.....		
1922.....	17,776	584,388	1935.....		
1923.....	29,597	709,836	1936.....		
1924.....	33,107	747,407	1937.....		
1925.....	36,355	829,770	Totals.....	1,600,789	\$46,304,833
1926.....	32,884	812,285			

* Annual details concealed under 'Unapportioned.'

SALT

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.). Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Imperial, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County, and from a mineral spring in Butte County.

During 1937 there was an output in California of 370,431 tons of salt worth \$1,044,325, compared with 398,249 tons worth \$1,227,505

in 1936. There were twelve companies operating plants in 1937 two in San Bernardino County and one each in Alameda, Butte, Imperial, Kern, Los Angeles, Modoc, Monterey, Orange, San Diego, and San Mateo.

The average value reported for salt produced in California during 1937 was \$2.82 per ton f.o.b. plant, compared with \$3.08 in 1936; \$3.36 in 1935; \$3.68 in 1934; \$3.89 in 1933; and \$3.58 in 1932.

Production of Salt in California, by Years.

Although salt has been made in California since the early '60's, there are no definite or authenticated records for the earlier years before the beginning of the statistical tabulations by the State Mining Bureau.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887	28,000	\$112,000	1913	204,407	\$462,681
1888	30,800	92,400	1914	223,806	583,553
1889	21,000	63,000	1915	169,028	368,737
1890	8,729	57,085	1916	186,148	455,695
1891	20,094	90,303	1917	227,825	584,373
1892	23,570	104,788	1918	212,076	806,328
1893	50,500	213,000	1919	233,994	896,963
1894	49,131	140,087	1920	230,638	972,648
1895	53,031	150,576	1921	197,989	832,702
1896	64,743	153,244	1922	223,238	819,187
1897	67,851	157,520	1923	275,979	1,130,670
1898	93,421	170,855	1924	318,800	1,159,137
1899	82,654	149,588	1925	284,068	949,826
1900	89,338	204,754	1926	311,761	1,124,978
1901	126,218	366,376	1927	263,028	639,127
1902	115,208	205,876	1928	340,580	1,024,656
1903	102,895	211,365	1929	392,039	2,665,436
1904	95,968	187,300	1930	347,945	1,167,487
1905	77,118	141,925	1931	330,951	1,233,567
1906	101,650	213,228	1932	256,353	918,480
1907	88,063	310,967	1933	321,312	1,251,024
1908	121,764	281,469	1934	332,194	1,222,810
1909	155,680	414,708	1935	365,711	1,230,480
1910	174,920	395,417	1936	398,249	1,227,505
1911	173,332	324,255	1937	370,431	1,044,325
1912	185,721	383,370			
			Totals	9,218,949	\$30,067,831

SODA

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XX, XXII, XXIII, XXV-XXIX (inc.). Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1936 included: Soda ash, trona, caustic soda, and bicarbonate from plants at Owens Lake, Inyo County; and soda ash, salt cake, and trona ('sesqui-carbonate,' a double salt of Na_2CO_3 and NaHCO_3) from Searles Lake, San Bernardino County. There were no shipments of salt cake (sulphate) from Carrizo Plains, San Luis Obispo County.

The output for 1937 amounted to 153,865 tons valued at \$1,461,057, as compared with 144,314 tons worth \$1,412,788 in 1936.

The dense ash and bicarbonate were used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes.

Soda Production of California, by Years.

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

Year	Tons	Value	Year	Tons	Value
1894.....	1,530	\$20,000	1917.....	24,505	\$928,578
1895.....	1,900	47,500	1918.....	20,447	855,423
1896.....	3,000	65,000	1919.....	21,294	721,958
1897.....	5,000	110,000	1920.....	32,407	1,164,898
1898.....	7,000	154,000	1921.....	14,828	438,996
1899.....	10,000	250,000	1922.....	20,084	573,661
1900.....	1,000	50,000	1923.....	34,885	764,284
1901.....	8,000	400,000	1924.....	32,536	711,796
1902.....	7,000	50,000	1925.....	45,625	947,649
1903.....	18,000	27,000	1926.....	63,333	1,305,802
1904.....	12,000	18,000	1927.....	62,571	1,478,239
1905.....	15,000	22,500	1928.....	80,838	1,469,297
1906.....	12,000	18,000	1929.....	90,646	1,835,657
1907.....			1930.....	90,122	1,627,344
1908.....	9,600	14,400	1931.....	78,701	1,217,811
1909.....	7,712	11,593	1932.....	58,017	826,369
1910.....	8,125	11,862	1933.....	70,598	1,019,130
1911.....	9,023	52,887	1934.....	99,380	1,219,561
1912.....	7,200	37,094	1935.....	125,504	1,341,045
1913.....	1,861	24,936	1936.....	144,314	1,412,788
1914.....	6,522	115,396	1937.....	153,685	1,461,057
1915.....	5,799	83,485			
1916.....	10,593	264,825			
			Totals.....	1,635,185	\$25,172,821

CHAPTER SEVEN

BY COUNTIES

Introductory.

The State of California includes a total area of 158,297 square miles, of which 155,652 square miles are of land. The maximum width is 235 miles, the minimum 148 miles, and the length from the north-west corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1930 census figures show a total population for California of 5,672,009. Minerals of commercial value exist in every county, and during 1936 some active production was reported to the State Division of Mines from all of the fifty-eight.

Rank of Counties in Mineral Yield, 1937.

Of the ten leading counties in point of total value of mineral output for 1937, the first five, viz., Los Angeles, Kern, Fresno, Orange, and Ventura, also Kings eighth and Santa Barbara ninth, owe their position to petroleum and natural gas. Los Angeles County, due to crude oil, led all other counties in 1937 and is credited with 28% of the State's total mineral value, holding this position since 1923 when it passed Kern, which previously led the State for many years. San Bernardino (sixth) owes its position to cement, borates, and potash. Nevada (seventh) owes its position to gold; and Sacramento (tenth) to gold.

There were twenty-eight counties having a mineral production valued in excess of a million dollars in 1937, in seven of which petroleum was an important item; in thirteen gold; in six each, natural gas and cement; in two, borates and miscellaneous stone; and in one each potash and soda, diatomite.

In point of variety and diversity San Bernardino County led all others in 1937 with twenty-six different mineral substances on its commercial list; followed by Los Angeles County with twenty-two; Inyo County with eighteen; Kern County with sixteen; Fresno County with fifteen; Imperial and San Diego counties each with fourteen; El Dorado, Riverside, and San Luis Obispo counties each with thir-

teen; Calaveras and Placer counties each with twelve; Butte and Siskiyou counties each with eleven; Mariposa, Monterey, Santa Barbara, Tulare, and Tuolumne counties each with ten.

No.	County	Value	No.	County	Value
1	Los Angeles.....	\$100,337,635	31	Mono.....	\$804,925
2	Kern.....	74,162,134	32	Santa Clara.....	722,903
3	Fresno.....	41,178,791	33	Trinity.....	721,290
4	Orange.....	22,659,380	34	San Joaquin.....	706,620
5	Ventura.....	19,230,720	35	Imperial.....	677,401
6	San Bernardino.....	16,012,330	36	San Diego.....	591,479
7	Nevada.....	11,385,056	37	San Benito.....	504,510
8	Kings.....	11,008,597	38	Lake.....	392,585
9	Santa Barbara.....	10,709,056	39	Napa.....	356,146
10	Sacramento.....	4,230,689	40	San Luis Obispo.....	323,691
11	Riverside.....	4,057,127	41	Tulare.....	314,952
12	Amador.....	3,917,866	42	Marin.....	300,204
13	Calaveras.....	3,279,250	43	Sonoma.....	273,063
14	El Dorado.....	2,607,972	44	Monterey.....	262,651
15	Yuba.....	2,587,748	45	Solano.....	145,567
16	Merced.....	2,535,126	46	Glenn.....	136,368
17	Alameda.....	2,476,302	47	Madera.....	133,165
18	Plumas.....	2,354,957	48	Mendocino.....	114,705
19	San Mateo.....	2,310,784	49	Humboldt.....	100,715
20	Shasta.....	2,199,423	50	Lassen.....	86,240
21	Santa Cruz.....	2,074,463	51	Tehama.....	65,193
22	Contra Costa.....	1,867,309	52	Yolo.....	44,171
23	Butte.....	1,798,992	53	San Francisco.....	41,825
24	Placer.....	1,754,040	54	Modoc.....	36,990
25	Inyo.....	1,439,009	55	Del Norte.....	30,647
26	Mariposa.....	1,270,774	56	Sutter.....	22,959
27	Siskiyou.....	1,200,351	57	Alpine.....	22,791
28	Tuolumne.....	1,012,180	58	Colusa.....	9,424
29	Sierra.....	974,680			
30	Stanislaus.....	940,030			
				Total value.....	\$361,515,951

ALAMEDA

Land area: 732 square miles.

Population: 475,153 (1930 census).

Location: East side of San Francisco Bay.

County seat: Oakland.

References: State Mineralogist Report XVII : XVIII : XX : XXVI (Oct., 1929).

Alameda, while in no sense one of the 'mining counties,' came seventeenth on the list of counties as to value, with a mineral production for 1937 worth \$2,476,302, and had seven different substances. This was an increase over the 1936 output which was valued at \$2,413,-115. Commercial production for 1937 was as follows:

Substance	Amount	Value
Clay.....	5,506 tons	\$9,712
Miscellaneous stone.....		1,361,781
Unapportioned*.....		1,104,809
Total value.....		\$2,476,302

* Includes brick and hollow building-tile, bromine, lime, and salt.

ALPINE

Land area: 776 square miles.

Population: 236 (1930 census).

Location: On eastern border of State, south of Lake Tahoe.

County seat: Markleeville.

References: State Mineralogist Report XV : XVII : XVIII : XXVII (Oct., 1931).

Alpine County ranked fifty-seventh in value of output for 1937, which was \$22,791, compared with \$9,541 in 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	827 lbs.	\$100
Gold.....		13,790
Lead.....	6,991 lbs.	413
Silver.....	8,950 fine ozs.	6,923
Other minerals.....		1,565
Total value.....		\$22,791

AMADOR

Land area: 601 square miles.

Population: 8494 (1930 census).

Location: East-central part of State—Mother Lode District.

County seat: Jackson.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII : (April, 1927) : XXX.

Amador County ranked twelfth as to value of mineral output for 1937, with nine different substances worth \$3,917,866, compared with \$3,617,449 in 1936.

Amador at one time led the State in gold production, though exceeded in 1920-1923 and in 1926-1927 by Yuba and Nevada counties; but in 1925 and 1928 by Yuba only, in 1929-1930 and 1937 by Nevada only, and in 1931-1936 by Nevada and Sacramento.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Clay.....	66,397 tons	\$107,212
Copper.....	18,579 lbs.	2,248
Gold.....		3,712,835
Lead.....	7,004 lbs.	413
Silver.....	23,324 fine ozs.	18,041
Unapportioned*		77,117
Total value.....		\$3,917,866

* Includes brick, coal, platinum, miscellaneous stone.

BUTTE

Land area: 1722 square miles.

Population: 34,010 (1930 census).

Location: North-central portion of State.

County seat: Oroville.

References: State Mineralogist Report XV : XVII : XVIII : XXIV : XXVI (Oct., 1930) : XXXI (Jan., 1936).

Butte County ranked twenty-third in regard to value of mineral output in 1937, with eleven different substances, having a total value of \$1,798,992, as compared with \$1,393,874 in 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	2,545 lbs.	\$308
Gold.....		1,558,305
Silver.....	23,728 fine ozs.	18,354
Miscellaneous stone.....		219,412
Unapportioned*.....		2,613
Total value.....		\$1,798,992

* Includes lead, mineral water, natural gas, platinum, salt, soapstone.

CALAVERAS

Land area: 1027 square miles.

Population: 6009 (1930 census).

Location: East-central portion of State—Mother Lode District.

County seat: San Andreas.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI : XXXII (July, 1936).

Calaveras County ranked thirteenth in California in regard to value of mineral output in 1937, with a total of \$3,279,250, as compared with \$3,513,180 in 1936.

Commercial production for 1937 consisting of ten different substances, was as follows:

Substance	Amount	Value
Copper.....	9,703 lbs.	\$1,174
Gold.....		1,730,435
Lead.....	1,816 lbs.	107
Silver.....	12,733 fine ozs.	9,849
Miscellaneous stone.....		76,880
Unapportioned*.....		1,460,805
Total value.....		\$3,279,250

* Includes cement, clay, mineral water, platinum, slate.

COLUSA

Land area: 1140 square miles.

Population: 10,257 (1930 census).

Location: Sacramento Valley.

County seat: Colusa.

References: State Mineralogist Report XIV : XVII : XVIII : XXV : (April, 1929).

Colusa County ranked fifty-eighth in regard to the value of mineral output in 1937 with three different mineral substances, worth a total of \$9,424, as compared with \$15,483 in 1936.

Commercial production for 1937 included mineral water, quick-silver, and miscellaneous stone.

CONTRA COSTA

Land area: 714 square miles.

Population: 78,554 (1930 census).

Location: East side of San Francisco Bay.

County seat: Martinez.

References: State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927).

Contra Costa County stands twenty-second on the list in respect to value of mineral output for 1937, with eight different substances worth \$1,867,309, as compared with \$1,706,131 in 1936.

Commercial production for 1937 was as follows:

Substance	Value
Brick and hollow building tile.....	\$497,543
Miscellaneous stone.....	518,760
Unapportioned*.....	851,006
Total value.....	\$1,867,309

* Includes cement, clay, mineral water, quicksilver, silica (glass sand).

DEL NORTE

Land area: 1024 square miles.

Population: 4734 (1930 census).

Location: Extreme northwest corner of State.

County seat: Crescent City.

References: State Mineralogist Report XIV : XVII : XXI (July, 1925) : XXIX (Jan.-April, 1933).

Del Norte County was in fifty-fifth place as to mineral production for 1937 with four different substances worth \$30,647, as compared with \$16,776 in 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$2,625
Silver.....	10 fine ozs.	8
Unapportioned*.....		28,014
Total value.....		\$30,647

*Includes chromite and miscellaneous stone.

EL DORADO

Land area: 1753 square miles.

Population: 8303 (1930 census).

Location: East-central portion of the State, northernmost of the Mother Lode counties.

County seat: Placerville.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (Oct., 1926) : XXXI.

El Dorado County, which contains the location where gold in California was first heralded to the world, comes fourteenth on the list of counties ranked according to value for 1937, with thirteen different mineral substances worth \$2,607,972. In addition to the segregated figures here given, a large tonnage of limestone was formerly shipped for use in cement manufacture, the value being included in the State's total for cement. The 1936 output was valued at \$2,796,980.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	65,353 lbs.	\$7,908
Gold.....		1,719,795
Lead.....	6,011 lbs.	355
Limestone.....	227,721 tons	448,130
Silver.....	10,650 fine ozs.	8,238
Miscellaneous stone.....		20,784
Unapportioned*		402,762
Total Value.....		\$2,607,972

* Includes chromite, lime, mineral water, platinum, slate, soapstone.

FRESNO

Land area: 5950 square miles.

Population: 144,369 (1930 census).

Location: South-central portion of State.

County seat: Fresno.

References: State Mineralogist Report XIV : XVII : XVIII : XXV (July, 1929).

Fresno County, third in importance as a mineral producer among the counties of California, reports an output for 1937 of fifteen different mineral substances, with a total value of \$41,178,791, as compared with the 1936 value of \$40,245,111.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$8,540
Natural gas.....	67,274,419 M cu. ft.	4,308,280
Petroleum.....	29,091,322 bbls.	36,521,804
Silver.....	55 fine ozs.	43
Miscellaneous stone.....		187,379
Unapportioned*		152,745
Total value.....		\$41,178,791

* Includes brick and hollow building-tile, chromite, clay (pottery and oil well drilling-mud), copper, feldspar, granite, gypsum, limestone (marl), quicksilver.

GLENN

Land area: 1259 square miles.

Population: 10,935 (1930 census).

Location: West side of Sacramento Valley.

County seat: Willows.

References: State Mineralogist Report XIV : XVII : XVIII.

Glenn County stands forty-sixth as a mineral producing county of the State for 1937 and owes its position mainly to the presence of large deposits of sand and gravel, much of which is used as railroad ballast.

Commercial production for 1937 totaled \$136,368, which is an increase over \$134,466, the 1936 total.

HUMBOLDT

Land area: 3634 square miles.

Population: 43,189 (1930 census).

Location: Northwestern portion of State, bordering on Pacific Ocean.

County seat: Eureka.

References: State Mineralogist Report XIV : XVII : XVIII : XXI (July, 1925).

Humboldt County ranked forty-ninth in the value of its mineral output among the counties of the State for 1937, with seven different mineral substances valued at \$100,715, compared with the 1936 output worth \$78,098.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$27,230
Silver.....	122 fine ozs.	94
Miscellaneous stone.....		70,596
Unapportioned*.....		2,795
Total value.....		\$100,715

* Includes brick, clay, natural gas, platinum.

IMPERIAL

Land area: 4089 square miles.

Population: 60,894 (1930 census).

Location: Extreme southeast corner of the State.

County seat: El Centro.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (April, 1926).

Imperial County ranked thirty-fifth in total value of mineral output for 1937, with fourteen different mineral substances, worth \$677,401, compared with \$256,941 for 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	118,138 lbs.	\$14,295
Gold.....		298,095
Lead.....	8,210 lbs.	454
Silver.....	3,287 fine ozs.	2,542
Miscellaneous stone.....		197,981
Unapportioned*.....		164,004
Total value.....		\$677,401

*Includes carbon dioxide, clay, gems (Iceland spar), gypsum, mica (sericite), pumice, salt, kyanite.

INYO

Land area: 10,019 square miles.

Population: 6557 (1930 census).

Location: Lies on eastern border of State, north of San Bernardino County.

County seat: Independence.

References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (Oct., 1926) : XXVII : XXX : XXXIII.

Inyo County's mineral output for 1937 reached a total value of \$1,439,009, having eighteen different mineral substances and standing twenty-fifth among the counties of the State as to value of production. The 1936 yield was worth \$1,470,847.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	71,080 lbs.	\$8,601
Gold.....		620,585
Lead.....	1,908,280 lbs.	112,589
Pumice and volcanic ash.....	2,721 tons	29,518
Silver.....	102,003 fine ozs.	78,899
Zinc.....	22,364 lbs.	1,454
Miscellaneous stone.....		22,087
Unapportioned*.....		565,276
Total value.....		\$1,439,009

* Includes bentonite, borates, dolomite, iron ore, quicksilver, slate, talc, soda, sulphur, tungsten.

KERN

Land area: 8003 square miles.

Population: 82,219 (1930 census).

Location: South-central portion of State.

County seat: Bakersfield.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXV (Jan., 1929) : XXIX (July-Oct., 1933) : XXX.

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924-1937, for which petroleum is responsible. The 1936 production consisted of sixteen different mineral substances valued at \$74,162,134, compared with the 1936 output worth \$65,344,764.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Clay (pottery and oil well drilling mud)	42,628 tons	\$130,482
Copper	5,504 lbs.	666
Gold		2,465,085
Lead	2,923 lbs.	172
Natural gas	65,142,854 M cu. ft.	3,950,521
Petroleum	69,878,714 bbls.	61,905,918
Silver	726,197 fine ozs.	561,712
Miscellaneous stone		237,757
Unapportioned*		4,909,821
Total value		\$74,162,134

* Includes borates, brick, cement, volcanic ash, quicksilver, salt, tungsten ore.

KINGS

Land area: 1559 square miles.

Population: 25,277 (1930 census).

Location: South-central portion of the State.

County seat: Hanford.

References: State Mineralogist Report XIV : XVII : XVIII : XXVI (Oct., 1930).

Kings County, previous to the discovery of Kettleman Hills oil fields in 1928, had little or no mineral output, but in 1929 it ranked ninth in total value of annual mineral production, seventh in 1930, third in 1931, and eighth in 1936-1937.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Natural gas	45,924,599 M cu. ft.	\$2,944,800
Petroleum	5,800,589 bbls.	8,062,833
Other minerals		964
Total value		\$11,008,597

LAKE

Land area: 1278 square miles.

Population: 7166 (1930 census).

Location: About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.

County seat: Lakeport.

References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929).

Lake County was in thirty-eighth place as to the value of mineral output for 1937, with four different mineral substances, worth \$392,585, compared with \$341,066 for 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Mineral water	38,489 gals.	\$33,858
Quicksilver	4,012 flasks	341,444
Miscellaneous stone		17,258
Other minerals		25
Total value		\$392,585

LASSEN

Land area: 4531 square miles.

Population: 12,587 (1930 census).

Location: Northeast portion of State.

County seat: Susanville.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Lassen County was in fiftieth place as a mineral producer for 1937, with output of \$86,240, being an increase from \$66,283, which was the value for the previous year.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$21,175
Silver.....	1,465 fine ozs.	1,133
Miscellaneous stone.....		63,257
Other minerals.....		675
Total value.....		\$86,240

LOS ANGELES

Land area: 4067 square miles.

Population: 2,201,526 (1930 census).

Location: One of the southwestern coast counties.

County seat: Los Angeles.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXX : XXXIII (July, 1937).

The mineral production for Los Angeles County for the year 1937 amounted in value to \$100,337,635, as compared with the 1936 output worth \$86,227,432. This accounted for 28% of the entire State's total for 1937 and ranked Los Angeles first in the State as a mineral producer.

Commercial production for 1937, consisting of 22 substances, was as follows:

Substance	Amount	Value
Brick.....	80,400 M	\$1,586,821
Hollow building-tile.....	6,355 tons	45,122
Clay.....	17,828 tons	15,083
Gold.....		140,070
Lead.....	7,046 lbs.	416
Mineral water.....	8,615,029 gals.	750,512
Natural gas.....	65,459,580 M cu. ft.	4,655,204
Petroleum.....	86,659,477 bbls.	83,922,309
Silver.....	2,308 fine ozs.	1,785
Miscellaneous stone.....		8,655,018
Unapportioned*		565,295
Total value.....		\$100,337,635

* Includes copper, diatomite, dolomite, granite (mica schist used for building stone), iodine, limestone, marble (limestone used for building), salt, sandstone, slate, soapstone.

MADERA

Land area: 2112 square miles.

Population: 17,152 (1930 census).

Location: East-central portion of State.

County seat: Madera.

References: State Mineralogist Report XIV : XVII : XVIII :
XXIV (Oct., 1928) : XXX : XXXI.

Madera County was in forty-seventh place as a mineral producer for 1937, with an output of seven different substances valued at \$133,165, compared with \$222,592 for 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	2,007 lbs.	\$243
Gold.....		13,615
Silver.....	142 fine ozs.	110
Miscellaneous stone.....		70,502
Unapportioned*.....		48,695
Total value.....		\$133,165

* Includes granite, pumice and volcanic ash.

MARIN

Land area: 529 square miles.

Population: 41,635 (1930 census).

Location: Adjoins San Francisco on the north.

County seat: San Rafael.

References: State Mineralogist Report XIV : XVII : XVIII :
XXII (July, 1926) : XXIX.

Marin County had forty-second place as to the value of mineral output for 1937, with four different mineral substances. The total was \$300,204, compared with \$222,974 in 1936.

Commercial production for 1937 was as follows:

Substance	Value
Miscellaneous stone.....	\$296,844
Other minerals.....	3,360
Total value.....	\$300,204

MARIPOSA

Land area: 1453 square miles.

Population: 2530 (1930 census).

Location: Most southerly of the Mother Lode counties. East central portion of State.

County seat: Mariposa.

References: State Mineralogist Report XIV : XVII : XVIII :
XXIV (April, 1928) : XXXI (Jan., 1935).

Mariposa County is one of the distinctly 'mining' counties of the State, although it stands but twenty-sixth on the list of counties in

regard to the value of its mineral output for 1937, with a total of \$1,270,774, as compared with \$1,130,018 for 1936. Mariposa County is also the source of a large tonnage of limestone annually, which is otherwise credited to cement manufacture in Merced County.

Commercial production, with ten different mineral substances, for 1937 was as follows:

Substance	Amount	Value
Copper.....	11,927 lbs.	\$1,443
Gold.....		1,025,010
Silver.....	7,866 fine ozs.	6,084
Miscellaneous stone.....		65,283
Unapportioned*.....		172,954
Total value.....		\$1,270,774

*Includes barite, lead, granite, mica (sericite), pumice.

MENDOCINO

Land area: 3452 square miles.

Population: 23,491 (1930 census).

Location: Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.

County seat: Ukiah.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX.

Mendocino County's mineral output for 1937 was valued at \$114,705, which gave it a rank of forty-eighth among the counties of the State as a mineral producer; compared with \$35,596 for 1936.

Commercial production for 1937 included natural gas and miscellaneous stone.

MERCED

Land area: 1995 square miles.

Population: 36,900 (1930 census).

Location: About the geographical center of the State.

County seat: Merced.

References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXI (Jan., 1935).

Merced County ranks sixteenth as to the value of mineral output for 1937, with six different substances worth \$2,535,126, compared with \$2,009,328 for 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$1,858,815
Silver.....	5,525 fine ozs.	4,274
Miscellaneous stone.....		36,157
Other minerals.....		635,880
Total value.....		\$2,535,126

MODOC

Land area: 3823 square miles.

Population: 8038 (1930 census).

Location: The extreme northeast corner of the State.

County seat: Alturas.

References: State Mineralogist Report XV : XVII : XVIII : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Modoc County, in fifty-fourth place, with six different mineral substances, reported a commercial production as follows:

Substance	Amount	Value
Gold.....		\$210
Silver.....		3
Miscellaneous stone.....	4 fine ozs.	35,381
Unapportioned*.....		1,396
Total value.....		\$36,990

* Includes gems and salt.

MONO

Land area: 3030 square miles.

Population: 1359 (1930 census).

Location: Is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.

County seat: Bridgeport.

References: State Mineralogist Report XV : XVII : XVIII : XX : XXIII (Oct., 1927) : XXX.

Mono County, in thirty-first place with seven different mineral substances, reported a commercial production for 1937, as follows:

Substance	Amount	Value
Cooper.....	13,216 lbs.	\$1,599
Gold.....		182,105
Lead.....	12,938 lbs.	763
Silver.....	631,347 fine ozs.	488,347
Miscellaneous stone.....		87,253
Other minerals.....		44,858
Total value.....		\$804,925

MONTEREY

Land area: 3330 square miles.

Population: 53,668 (1930 census).

Location: West-central portion of State, bordering on Pacific Ocean.

County seat: Salinas.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Jan., 1925) : XXXI.

Monterey County produced ten different mineral substances during 1937, having a total value of \$262,651, as compared with \$187,750 for 1936.

In forty-fourth place, commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$1,960
Silver.....	4 fine ozs.	3
Miscellaneous stone.....		206,700
Unapportioned*		53,988
Total value.....		\$262,651

* Includes diatomite, dolomite, natural gas, quicksilver, salt, sandstone, silica.

NAPA

Land area: 783 square miles.

Population: 22,832 (1930 census).

Location: Directly north of San Francisco Bay—one of the 'bay counties.'

County seat: Napa.

References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (April, 1929).

In 1937 the value of Napa County's mineral output was \$356,146, placing it in thirty-ninth place in the list of counties, as compared with \$567,153 for 1936.

With nine different mineral substances, commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	1,156 lbs.	\$140
Gold.....		12,355
Mineral water.....	77,531 gals.	15,683
Quicksilver.....	329 flasks	26,051
Silver.....	66,763 fine ozs.	51,641
Miscellaneous stone.....		246,665
Other minerals.....		3,611
Total value.....		\$356,146

NEVADA

Land area: 974 square miles.

Population: 10,589 (1930 census).

Location: North of Lake Tahoe on the eastern border of the State.

County seat: Nevada City.

References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXVI (April, 1930) : XXXI : XXXII.

Nevada County, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were passed by Yuba in 1918-1921, also 1923. In 1922, 1924, 1929 to 1937, Nevada led all counties in gold output, though it held third place in 1925 and 1928, and second place in 1926 and 1927. Nevada County stands seventh on the list of counties in regard to value of its mineral output for 1937, with nine different mineral substances worth \$11,385,-

056, as compared with \$10,322,695 for 1936. The increase was due to gold and silver.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	178,643 lbs.	\$21,616
Gold.....		10,805,200
Lead.....	316,006 lbs.	18,644
Silver.....	506,143 fine ozs.	391,502
Miscellaneous stone.....		144,300
Unapportioned*.....		3,794
Total value.....		\$11,385,056

* Includes granite, mineral paint, platinum.

ORANGE

Land area: 795 square miles.

Population: 118,611 (1930 census).

Location: Southwest portion of the State, bordering Pacific Ocean.

County seat: Santa Ana.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXI (Jan., 1925) : XXXI.

Orange County, in fourth place as to value of mineral output for 1937, produced seven mineral substances, worth \$22,659,380, as compared with \$22,132,919 for 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Clay.....	29,415 tons	\$84,513
Natural gas.....	23,535,696 M cu. ft.	1,599,811
Petroleum.....	22,060,820 bbls.	20,854,524
Miscellaneous stone.....		112,025
Unapportioned*.....		8,507
Total value.....		\$22,659,380

*Includes brick and salt.

PLACER

Land area: 1395 square miles.

Population: 24,442 (1930 census).

Location: Eastern border of State directly west of Lake Tahoe.

County seat: Auburn.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1937) : XXXI : XXXII (Jan., 1936).

Placer County, in twenty-fourth place, with twelve different mineral substances, had a commercial production for 1937 as follows, compared with \$1,554,865 for the previous year:

Substance	Amount	Value
Clay.....	70,960 tons	\$107,138
Copper.....	5,959 lbs.	721
Gold.....		1,594,320
Lead.....	10,432 lbs.	615
Silver.....	25,970 fine ozs.	20,088
Unapportioned*.....		31,158
Total value.....		\$1,754,040

* Includes brick and hollow building-tile, chromite, granite, mineral paint, platinum, miscellaneous stone, zircon sand

PLUMAS

Land area: 2594 square miles.

Population: 7909 (1930 census).

Location: Northeastern border of State, south of Lassen County.

County seat: Quincy.

References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXIV (Oct., 1928) : XXIX : XXX : XXXIII (April, 1937).

Plumas County's mineral output for 1937 with seven different mineral substances was valued at \$2,354,957, as compared with \$1,923,777 for 1936.

In eighteenth place, commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	9,879,959 lbs.	\$1,195,475
Gold.....		911,610
Silver.....	293,554 fine ozs.	227,296
Miscellaneous stone.....		20,317
Unapportioned*.....		259
Total value.....		\$2,354,957

* Includes lead and granite.

RIVERSIDE

Land area: 7240 square miles.

Population: 82,078 (1930 census).

Location: Southern portion of State.

County seat: Riverside.

References: State Mineralogist Report XV : XVII : XVIII : XX : XXV (Oct., 1929) : XXX : XXXI.

Riverside is the fourth county in the State in size and the eleventh in regard to the total value of mineral output for 1937. Within its borders are included mountain, desert, and agricultural land. In point of variety Riverside County showed thirteen different mineral substances commercially produced in 1937 with a total value of \$4,057,127, compared with the 1936 output which was valued at \$4,449,170.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Clay.....	64,462 tons	\$117,798
Gold.....		215,040
Lead.....	4,028 lbs.	238
Silver.....	5,519 fine ozs.	4,269
Miscellaneous stone.....		342,073
Unapportioned*		3,377,709
Total value.....		\$4,057,127

* Includes brick and hollow building-tile, cement, copper, granite, gypsum, mineral water, silica.

SACRAMENTO

Land area: 983 square miles.

Population: 141,915 (1930 census).

Location: North-central portion of State.

County seat: Sacramento.

References: State Mineralogist Report XV : XVII : XVIII : XX : XXI (Jan., 1925) : XXXI.

Sacramento stands tenth among the counties of the State as a mineral producer, the output, principally gold, for 1937 being valued at \$4,230,689, as compared with the 1936 production worth \$4,254,685. In regard to gold output alone, this county ranks third, being exceeded by Nevada and Amador, the Sacramento product coming from the dredges. With seven mineral substances, commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$3,600,765
Silver.....	4,342 fine ozs.	3,359
Miscellaneous stone.....		513,699
Unapportioned*		112,866
Total value.....		\$4,230,689

* Includes brick and hollow building-tile, natural gas, platinum.

SAN BENITO

Land area: 1392 square miles.

Population: 11,310 (1930 census).

Location: West-central portion of State.

County seat: Hollister.

References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (April, 1926).

San Benito County ranked thirty-seventh among the counties in regard to the value of total mineral production for 1937, having an output worth \$504,510, as compared with \$348,812 for the previous year.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Quicksilver.....	1,756 flasks	\$146,524
Unapportioned*		357,986
Total value.....		\$504,510

* Includes bentonite, coal, dolomite, miscellaneous stone.

SAN BERNARDINO

Land area: 20,157 square miles.

Population: 133,827 (1930 census).

Location: Southeastern portion of State.

County seat: San Bernardino.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XXVI (July, 1930) : XXVII (July, 1931) : XXX.

San Bernardino, by far the largest county in the State in area, ranked sixth in regard to the value of mineral output for 1937, with a total of \$16,012,330, as compared with the 1936 total of \$15,396,166.

San Bernardino, for several years (except 1918), has led all other counties in the State in point of variety of minerals, producing commercially in 1937 a total of twenty-six different substances.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Clay.....	5,765 tons	\$50,252
Copper.....	28,760 lbs.	3,480
Gold.....		218,925
Lead.....	108,211 lbs.	6,266
Silver.....	359,201 fine ozs.	277,842
Zinc.....	17,279 lbs.	1,123
Limestone.....	25,967 tons	76,850
Miscellaneous stone.....		307,337
Unapportioned*		15,070,255
Total value.....		\$16,012,330

* Includes bentonite, borates, brick, calcium chloride, cement, fluorspar, granite, iron ore, lime, onyx, mineral water, soda, talc, salt, potash, petroleum, tungsten ore.

SAN DIEGO

Land area: 4221 square miles.

Population: 209,477 (1930 census).

Location: Extreme southwest corner of State.

County seat: San Diego.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (July, 1925), XXX.

San Diego County ranked thirty-sixth in the total value of its mineral output for the year 1937 with fourteen different mineral substances on the commercial list. The value for 1937 was \$591,479, as compared with the 1936 output worth \$582,556.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$2,100
Silver.....	18 fine ozs.	14
Miscellaneous stone.....		312,939
Unapportioned*.....		276,426
Total value.....		\$591,479

* Includes brick and hollow building-tile, bromine, clay, gems, granite, magnesium chloride, mineral water, salt, silica (quartz), feldspar.

SAN FRANCISCO

Land area: 46½ square miles.

Population: 637,212 (1930 census).

County seat: San Francisco.

Reference: State Mineralogist Report XVII : XVIII : XX : XXV (April, 1929).

Surprising as it may appear at first glance, San Francisco County is listed among the mineral-producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel, and mineral water.

In fifty-third place, commercial production for 1937 was as follows:

Substance	Value
Unapportioned*.....	\$41,825

* Includes mineral water and miscellaneous stone.

SAN JOAQUIN

Land area: 1448 square miles.

Population: 102,871 (1930 census).

Location: Central portion of State.

County seat: Stockton.

References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

San Joaquin County reported a mineral production for 1937 having a total value of \$706,620, as compared with \$461,064 for 1936. In thirty-fourth place, commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$79,765
Natural gas.....	5,740,226 M cu. ft.	484,381
Silver.....	162 fine ozs.	125
Miscellaneous stone.....		95,869
Other minerals.....		46,480
Total value.....		\$706,620

SAN LUIS OBISPO

Land area: 3334 square miles.

Population: 29,617 (1930).

Location: Bordered by Kern County on the east and the Pacific Ocean on the west.

County seat: San Luis Obispo.

References: State Mineralogist Report XV : XVII : XVIII : XXI (Oct., 1925) : XXXI (Oct., 1935).

The total value of the mineral production of San Luis Obispo County in 1937, with thirteen different mineral substances, was \$323,691 as compared with \$352,346 in 1936.

In fortieth place, commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$9,625
Quicksilver.....	2,133 flasks	179,731
Silver.....	19 fine ozs.	15
Unapportioned*.....		134,320
Total value.....		\$323,691

* Includes brick and hollow building-tile, clay (oil-well drilling-mud), limestone, marble (limestone used for building), mineral water, petroleum, volcanic ash, sandstone, miscellaneous stone.

SAN MATEO

Land area: 447 square miles.

Population: 77,338 (1930 census).

Location: Peninsula, adjoined by San Francisco on the north.

County seat: Redwood City.

References: State Mineralogist Report XVII : XVIII : XXV (April, 1929) : XXIX.

San Mateo County had a mineral output in 1937 of six different substances, having a total value of \$2,310,784, as compared with the 1936 production worth \$2,410,807.

In nineteenth place, commercial production for 1937 was as follows:

Substance	Value
Miscellaneous stone.....	\$85,680
Unapportioned*.....	2,225,104
Total value.....	\$2,310,784

* Includes cement, limestone (shells), magnesium carbonate, salt.

SANTA BARBARA

Land area: 2740 square miles.

Population: 65,075 (1930 census).

Location: Southwestern portion of State, adjoining San Luis Obispo on the south.

County seat: Santa Barbara.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Oct., 1925) : XXXII.

Santa Barbara County owes its position of ninth place in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1937 was \$10,709,056, as compared with the 1936 output of \$9,693,339.

With ten different substances, commercial production for 1937 was as follows:

Substance	Amount	Value
Natural gas.....	5,557,621 M cu. ft.	\$328,572
Petroleum.....	8,273,815 bbls.	8,961,642
Quicksilver.....	634 flasks	51,140
Unapportioned*.....		1,367,702
Total value.....		\$10,709,056

* Includes bituminous rock, brick and hollow building-tile, chromite, diatomite, marble (limestone used for building), mineral water, miscellaneous stone.

SANTA CLARA

Land area: 1328 square miles.

Population: 144,921 (1930 census).

Location: West-central portion of State.

County seat: San Jose.

References: State Mineralogist Report XVII : XVIII : XX : XXVI (Jan., 1930) : XXIX.

Santa Clara County reported a mineral output for 1937 of \$722,903, as compared with the 1936 figure of \$675,188.

In thirty-second place with nine mineral substances, commercial production for 1937 was as follows:

Substance	Amount	Value
Brick.....	22,658 M	\$219,087
Clay.....	3,182 tons	5,560
Limestone (shells).....	39,379 tons	74,041
Miscellaneous stone.....		262,816
Unapportioned*.....		161,299
Total value.....		\$722,903

* Includes gems, magnesite, petroleum, quicksilver.

SANTA CRUZ

Land area: 435 square miles.

Population: 37,405 (1930 census).

Location: Bordering Pacific Ocean, just south of San Mateo County.

County seat: Santa Cruz.

References: State Mineralogist Report XVII : XVIII : XXII (Jan., 1926) : XXIX.

The mineral output of Santa Cruz County, a portion of which is itemized below, amounted to a total of \$2,074,463 for 1937, giving

the county a standing of twenty-first among all others in the State in this regard. The 1936 figure was \$2,103,122.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Limestone.....	13,043 tons	\$45,754
Unapportioned*		2,028,709
Total value.....		\$2,074,463

* Includes bituminous rock, cement, lime, miscellaneous stone.

SHASTA

Land area: 3858 square miles.

Population: 13,925 (1930 census).

Location: North-central portion of State.

County seat: Redding.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XXII (April, 1926) : XXIX (Jan., April, 1933) : XXX.

Shasta County stood twentieth in California among the mineral-producing counties in 1937, with an output valued at \$2,199,423, as compared with the 1936 production worth \$1,699,902.

With eight mineral substances, commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	88,985 lbs.	\$10,767
Gold.....		1,773,275
Platinum metals.....	193 ozs.	9,051
Silver.....	39,801 fine ozs.	30,786
Miscellaneous stone.....		108,039
Other minerals.....		267,505
Total value.....		\$2,199,423

SIERRA

Land area: 923 square miles.

Population: 2419 (1930 census).

Location: Eastern border of State just north of Nevada County.

County seat: Downieville.

References: State Mineralogist report XVI : XVII : XVIII : XX : XXV (April, 1929) : XXXI.

Sierra County reported a mineral production of \$974,680 in 1937 which was mainly gold, as compared with the 1936 output worth \$787,634.

In twenty-ninth place, commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	1,213 lbs.	\$146
Gold.....		934,570
Silver.....	5,002 fine ozs.	3,869
Miscellaneous.....		36,092
Other minerals.....		3
Total value.....		\$974,680

SISKIYOU

Land area: 6256 square miles.

Population: 25,505 (1930 census).

Location: Extreme north-central portion of State, next to Oregon boundary.

County seat: Yreka.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (Oct., 1925) : XXVIII (Jan., 1931) : XXIX : XXX : XXXI (July, 1935).

Siskiyou, fifth county in California in regard to size, located in highly mineralized and mountainous country, ranks twenty-seventh in regard to mineral output with eleven mineral substances for 1937. The 1936 production was valued at \$831,103.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	1,186 lbs.	\$144
Gold.....		1,055,600
Silver.....	4,421 fine ozs.	3,420
Miscellaneous stone.....		103,519
Unapportioned*.....		37,668
Total value.....		\$1,200,351

* Includes lead, gems (rhodonite and Californite), mineral water, pumice, quicksilver, tube-mill pebbles.

SOLANO

Land area: 822 square miles.

Population: 40,807 (1930 census).

Location: Touching San Francisco Bay on the northeast.

County seat: Fairfield.

Solano, while mostly valley land, produced mineral substances during the year 1937 to the total value of \$145,567, ranking it forty-fifth among the counties of the State, compared with the 1936 output worth \$46,552.

Commercial production for 1937 included natural gas, quicksilver, and miscellaneous stone.

SONOMA

Land area: 1577 square miles.

Population: 62,248 (1930 census).

Location: South of Mendocino County, bordering on the Pacific Ocean.

County seat: Santa Rosa.

References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926).

Sonoma County ranked forty-third among the counties of California during 1937 with a mineral output valued at \$273,063, as compared with the 1936 figures of \$185,417.

Commercial output during 1937 was as follows:

Substance	Amount	Value
Quicksilver.....	281 flasks	\$22,085
Miscellaneous stone.....		235,585
Unapportioned*.....		15,393
Total value.....		\$273,063

* Includes clay, granite (tuff), lime, mineral water, sandstone.

STANISLAUS

Land area: 1450 square miles.

Population: 56,624 (1930 census).

Location: Center of State, bounded on south by Merced County.

County seat: Modesto.

References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918-1919 by manganese, and in 1921-1923 and 1925-1930 by miscellaneous stone. This county for 1937 ranked thirtieth in the State in regard to minerals, with an output valued at \$940,030, as compared with \$691,614 in 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$603,645
Silver.....	1,901 fine ozs.	1,470
Miscellaneous stone.....		57,147
Other minerals.....		277,768
Total value.....		\$940,030

SUTTER

Land area: 608 square miles.

Population: 14,618 (1930 census).

Location: Bounded by Butte County on the north and Sacramento on the south.

County seat: Yuba City.

References: State Mineralogist Report XV : XVII : XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral sub-

stance. In 1917 some crushed rock was taken out, from the Marysville Buttes, also in 1925-1928, and 1937.

There has been some utilization of natural gas and clay. Coal is found here, but no deposits of it have been placed on a productive basis. During 1937 there was a commercial output of pottery clay, natural gas, and miscellaneous stone, having a total value of \$22,959.

TEHAMA

Land area: 2893 miles.

Population: 13,839 (1930 census).

Location: North-central portion of the State, bounded on the north by Shasta.

County seat: Red Bluff.

References: State Mineralogist Report XV : XVII : XVIII : XIX : XXIV (July, 1928).

Tehama County stood fifty-first among the mineral-producing counties of the State for 1937, with an output valued at \$65,193, as compared with the 1936 yield worth \$100,403.

Commercial production in 1937 included miscellaneous stone.

TRINITY

Land area: 3166 square miles.

Population: 2811 (1930 census).

Location: Northwestern portion of State.

County seat: Weaverville.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (Jan., 1926) : XXIX (Jan., April, 1933) : XXX.

Trinity County's 1937 output of minerals was valued at \$721,290 as compared with the 1936 figure of \$724,109, mainly due to gold which gives the county a rank of thirty-third for the year.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$703,780
Platinum metals.....	155 ozs.	7,052
Silver.....	2,713 fine ozs.	2,099
Unapportioned*.....		8,359
Total value.....		\$721,290

* Includes coal, quicksilver, miscellaneous stone.

TULARE

Land area: 4856 square miles.

Population: 77,375 (1930 census).

Location: Bounded by Inyo on the east, Kern on the south, Fresno on the north.

County seat: Visalia.

References: State Mineralogist Report XV : XVII : XVIII : XX.

Tulare County stands forty-first on the list of mineral producing counties for 1937, with ten different mineral substances, having a total value of \$314,952, as compared with the 1936 figures of \$209,968.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$1,050
Silver.....	12 fine ozs.	9
Miscellaneous stone.....		136,539
Unapportioned*.....		177,354
Total value.....		\$314,952

* Includes brick and hollow building-tile, chromite, gems (Californite), natural gas, petroleum, tungsten ore.

TUOLUMNE

Land area: 2190 square miles.

Population: 9239 (1930 census).

Location: East-central portion of State—Mother Lode District.

County seat: Sonora.

References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXIV (Jan., 1928).

Tuolumne County ranks twenty-eighth among the counties of the State relative to its total value of mineral output for 1937 with ten different substances. This county ranks first as a producer of marble in the State. The mineral production for 1937 was valued at \$1,012,180, as compared with \$723,469 for 1936.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Copper.....	6,157 lbs.	\$745
Gold.....		690,585
Silver.....	7,975 fine ozs.	6,155
Miscellaneous stone.....		130,747
Unapportioned*.....		183,948
Total value.....		\$1,012,180

* Includes lead, lime, limestone, marble, slate.

VENTURA

Land area: 1878 square miles.

Population: 54,577 (1930 census).

Location: Southwestern portion of State, bordering on Pacific Ocean.

County seat: Ventura.

References: State Mineralogist Report XV : XVII : XVIII : XX : XXI : XXVIII (July-Oct., 1932).

Ventura is fifth in the State in respect to the value of its mineral output for 1937. The 1937 mineral production was worth \$19,230,720, as compared with the 1936 output valued at \$17,631,880.

With eight different mineral substances, commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$1,295
Natural gas.....	44,102,839 M cu. ft.	1,457,709
Petroleum.....	16,720,713 bbls.	17,562,688
Silver.....	2 fine ozs.	2
Miscellaneous stone.....		200,861
Unapportioned*.....		8,165
Total value.....		\$19,230,720

* Includes clay (oil-well drilling-mud), granite (volcanic rock).

YOLO

Land area: 1017 square miles.

Population: 23,618 (1930 census).

Location: Sacramento Valley, bounded by Sutter on the east and Colusa on the north.

County seat: Woodland.

References: State Mineralogist Report XIV : XVII : XVIII.

Yolo County in fifty-second place had a commercial production for 1937 as follows, compared with \$71,609 the preceding year:

Substance	Amount	Value
Gold.....		\$1,330
Silver.....	5 fine ozs.	4
Miscellaneous stone.....		40,765
Other minerals.....		2,072
Total value.....		\$44,171

YUBA

Land area: 639 square miles.

Population: 11,327 (1930 census).

Location: Lies west of Sierra and Nevada counties; south of Plumas.

County seat: Marysville.

References: State Mineralogist Report XV : XVII : XVIII : XX : XXVI (July, 1930) : XXXI.

Yuba County ranked fifteenth among the counties of the State as a mineral producer and fourth in respect to gold, which is obtained mainly by dredges. The 1936 output was valued at \$2,893,823.

Commercial production for 1937 was as follows:

Substance	Amount	Value
Gold.....		\$2,495,115
Silver.....	4,740 fine ozs.	3,666
Miscellaneous stone.....		85,695
Other minerals.....		2,272
Total value.....		\$2,587,748

CHAPTER VIII

DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA 1937

NOTE.—The producers of natural gas and petroleum will be found in the Quarterly Summary of Operations, California Oil Fields, for July, August and September, 1937 (Vol. 23, No. 1).

BARYTES

Operator	Address	Location of mine
<i>Mariposa County</i> California Barite Corp., E. S. McCurdy National Pigments Co.	10 Penthouse, Mills Bldg., San Francisco. Russ Bldg., San Francisco.	El Portal El Portal

BENTONITE (FULLER'S EARTH)

Operator	Address	Location of pit
<i>Inyo County</i> Chamberlain Co., Inc.	2550 E. 9th St., Los Angeles	Olancha
<i>San Benito County</i> D. L. Stewart Property, A. P. Stewart, Lessee.	1052 Vermont St., San Jose.	Tres Pinos
<i>San Bernardino County</i> Walter Becker Chamberlain Co., Inc. National Lead Co., National Pigments & Chemical Div.	Box 43, Red Mountain. 2550 E. 9th St., Los Angeles. 983 Wilson, Los Angeles.	Red Mountain Hector Hector

BITUMINOUS ROCK

Operator	Address	Location of mine
<i>Santa Barbara County</i> Higgins Quarry, D. A. Sattler, Lessee.	856 Arguello Rd., Santa Barbara.	Carpinteria
<i>Santa Cruz County</i> Calrock Asphalt Co.	525 Market St., San Francisco	Majors

BORATES

Operator	Address	Location of mine
<i>Inyo County</i> Pacific Alkali Co..... United States Borax Co.....	1209 Pacific Mutual Bldg., Los Angeles. 510 W. 6th St., Los Angeles.....	Bartlett Los Angeles
<i>Kern County</i> Pacific Coast Borax Co.....	510 W. 6th St., Los Angeles.....	Kramer
<i>San Bernardino County</i> American Potash and Chemical Corp..... West End Chemical Co.....	Trona..... Latham Square Bldg., Oakland.....	Trona Scarles Lake

BROMINE

Operator	Address	Location of mine
<i>Alameda County</i> Westvaco Chlorine Prod. Corp.....	Newark.....	Newark
<i>San Diego County</i> Westvaco Chlorine Prod. Corp.....	Newark.....	San Diego

CALCIUM CHLORIDE

Operator	Address	Location of mine
<i>San Bernardino County</i> California Rock Salt Co..... Hollar Chemical, Inc.....	2465 Hunter St., Los Angeles..... 200 S. Santa Fe Ave., Los Angeles.....	Amboy Funston

CARBON DIOXIDE GAS

Operator	Address	Location of wells
<i>Imperial County</i> National Dry Ice Co..... Pacific-Imperial Dry-Ice, Inc., Carl M. Einhardt, Pres.....	Niland Niland	Niland Niland

CEMENT

Operator	Address	Location of mill
<i>Calaveras County</i> Calaveras Cement Co.....	315 Montgomery St., San Francisco.....	San Andreas
<i>Contra Costa County</i> Henry Cowell Lime and Cement Co.....	2 Market St., San Francisco.....	Cowell
<i>Kern County</i> Monolith Portland Cement Co.....	Bartlett Bldg., Los Angeles.....	Monolith
<i>Los Angeles County</i> Blue Diamond Corp.....	1650 S. Alameda St., Los Angeles.....	Los Angeles
<i>Merced County</i> Yosemite Portland Cement Co.....	Merced.....	Merced
<i>Riverside County</i> Riverside Cement Co.....	621 S. Hope St., Los Angeles.....	Riverside
<i>San Bernardino County</i> California Portland Cement Co..... Southwestern Portland Cement Co.....	601 W. Fifth St., Los Angeles..... 503 Roosevelt Bldg., Los Angeles.....	Colton Victorville
<i>San Mateo County</i> Pacific Portland Cement Co.....	111 Sutter St., San Francisco.....	Redwood City
<i>Santa Cruz County</i> Santa Cruz Portland Cement Co.....	Crocker Bldg., San Francisco.....	Davenport

CHROMITE

CHROMITE

Operator	Address	Location of mine
<i>Del Norte County</i> Gordon Mountain Group, Clifford D. Fies High Plateau Group, Eugene Brown	1441 Riverside Dr., Roseburg, Oregon. O'Brien, Oregon.	Low Divide District Low Divide District
<i>El Dorado County</i> U. S. Chrome Mines, Inc., Alwyn H. Wild	2240 Hyde St., San Francisco.	Folsom
<i>Fresno County</i> Bradley & Ekstrom	320 Market St., San Francisco.	Tollhouse
<i>Santa Barbara County</i> Ernest D. Boaz	23 Arlington Ave., Santa Barbara.	Los Olivos
<i>Tulare County</i> Janoko Bros.	R.F.D. 1, Box 688, Porterville.	Porterville

CLAY—1937

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
<i>Alameda County</i>			
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b	116 Natomas St., San Francisco	Alameda
Electrical Porcelain Works	a	1289 Cedar St., Berkeley	Berkeley
Interlocking Tile Co.	a, c	Niles	Niles
Kraftile Co.	a, b	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
F. R. Stuyve	a	Box 26, Mt. Eden	Mt. Eden
Technical Porcelain and China Ware Co.	a	420 Kains Ave., Albany via Berkeley	Albany
Walrich Pottery	a	1285 Hearst Ave., Berkeley	Berkeley
Westinghouse Elec. & Mfg. Co., Emeryville Porcelain Works	a	62d and Green Sts., Emeryville	Emeryville
Woolenhus Tiles & Mantels	a	1315 2d St., Berkeley	Berkeley
<i>Amador County</i>			
M. J. Bacon	c	Lone	Carbondale
Cal. Mineral Products Co., Lone Clay and Sand Pit	c, f	Kohl Bldg., San Francisco	Lone
N. Clark & Sons	c	116 Natomas St., San Francisco	Lone
Clay Corp. of California	c	1267 Russ Bldg., San Francisco	Lone
Lone Fire Brick Co., J. T. Roberts, Mgr.	b	1267 Russ Bldg., San Francisco	Lone
Preston School of Industry	b	Lone	Lone
<i>Calaveras County</i>			
California Pottery Co.	c	Niles	Valley Springs
<i>Contra Costa County</i>			
California Art Tile Corp.	a	Box 1116, Richmond	Richmond
Old Mission Tile Co.	a, c	1 20th St., Richmond	San Pablo
Port Costa Brick Works, C. G. Berg, Pres.	b	6th and Berry Sts., San Francisco	Port Costa
Ed Roberts	c, f	Pittsburg	Pittsburg
Standard Sanitary Mfg. Co., H. W. Oregier, Mgr.	a	Box W, Richmond	Richmond
Stockton Fire Brick Co.	b	Russ Bldg., San Francisco	Pittsburg
United Materials & Richmond Brick Co., Ltd.	a, b, c	Box 7, Richmond	Richmond
<i>Fresno County</i>			
Graycroft Brick Co.	a, b	Griffith-McKenzie Bldg., Fresno	Fresno
<i>Humboldt County</i>			
D. J. Thompson Brick Co.	a, b, c	Box 16, Myrtle Ave., Eureka	Eureka
<i>Imperial County</i>			
McKnight Clay Deposit, J. H. McKnight	c	Hotel Barclay, 103 W. 4th St., Los Angeles	Glamis
<i>Inyo County</i>			
Chamberlain Co., Inc.	e	2550 E. 9th St., Los Angeles	Olancho

Kern County			
American Minerals Co.	2808 S. Pacific, San Pedro.	Cantil	
Bakersfield Sandstone Brick Co., James Curran, Mgr.	Bakersfield	Bakersfield	
C. W. Hartman	1402 King St., Bakersfield.	Bakersfield	
King Lumber Co.	Box 174, Los Nietos.	Muroc	
Mojave Corp.			
Los Angeles County			
Alhambra Kilns, Inc., L. C. Merwin	Alhambra	Alhambra and Santa Monica	
American Refractories Co.	3132 E. Pico Blvd., Los Angeles.	Los Angeles	
Angulo Tile Co., L. R. H. and W. H. Angulo	Reseda, Los Angeles County.	Reseda	
B. W. Tile Co.	14600 S. Western Ave., Gardena.	Gardena	
J. A. Bauer Pottery Co.	415 W. Ave. 33, Los Angeles.	Los Angeles	
J. Booth	1775 Stanford, Santa Monica.	Santa Monica	
Builders Brick Co., Ltd.	177th and Western Aves., Moneta.	Moneta and Compton	
Ceramic Corp.	4010 Whiteside St., Los Angeles.	Los Angeles	
City Brick Co.	1900 W. Manchester, Los Angeles.	Los Angeles	
Claycroft Potteries, Fred H. Robertson	3101 San Fernando Blvd., Los Angeles.	Los Angeles	
H. F. Coors Co., Inc.	Inglewood.	Inglewood	
Davidson Brick Co.	4701 Floral Dr., Los Angeles.	Los Angeles	
Eljer California Co.	4100 Alameda, Los Angeles.	Arcadia	
Emeco Refractories Co.	5601 S. Boyle Ave., Vernon.	Vernon	
Gladding, McBean & Co., Tropico, L. A. & S. M. Plants.	2901 Los Feliz Blvd., Los Angeles.	Tropico, Los Angeles, Santa Monica, Hermosa Beach, and Vernon	
Ha-Jo Tile & Pottery Co.	2304 E. 52d St., Los Angeles.	Los Angeles	
Higgins Brick & Tile Works, James R. Higgins.	Box 525, Moneta.	Moneta	
Italian Terra Cotta Co.	1149 Mission Rd., Los Angeles.	Los Angeles	
Long Beach Brick Co., Inc., H. A. Hayner, Mgr.	422 E. Broadway, Long Beach.	Long Beach	
Markoff Mosaic Tile Corp.	1107 E. Redondo Blvd., Inglewood.	Inglewood	
Myers Pottery Co.	2318 E. 52d St., Los Angeles.	Los Angeles	
Pacific Clay Products.	Box 145, Sta. A, Los Angeles.	Los Angeles and Los Nietos	
Pacific Tile & Porcelain Co.	3428 W. Pico Blvd., Los Angeles.	Los Angeles and Los Nietos	
Pomona Brick Co., Wm. McMullen, Mgr.	Pomona.	Pomona	
Pomona Tile Mfg. Co.	Pomona.	Pomona	
San Vallee Tile Kilns, R. F. Stubver, Mgr.	6601 Wilbur, Reseda.	Reseda	
Santa Catalina Island Co., Wm. Wrigley, Jr.	Avalon.	Santa Catalina Island	
St. Louis Fire Brick and Clay, Joseph Mesmer	3050 E. Slauson St., Los Angeles.	Los Angeles	
Simmons Brick Co., Walter R. Simons	1195 S. Boyle Ave., Los Angeles.	Los Angeles	
Tillotson Clay Products.	3363 Fruitland Rd., Vernon.	Vernon	
Vernon Potteries	2300 E. 52d St., Los Angeles.	Vernon	
Vitretrax Co.	5050 Pacific Blvd., Los Angeles.	Los Angeles	
Marin County			
McNear Brick Co.	McNear Point, San Rafael.	McNear	
a. Clay products. b. Brick and hollow building-tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand.			

CLAY—1937

(Including producers of crude clay, and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
<i>Monterey County</i>			
Castroville Clay Prod. Co.	a, c	Castroville	Castroville
<i>Orange County</i>			
Arnold Clay Mine, I. P. Arnold	c, f	1846 W. 83d St., Los Angeles	El Toro
Gladding, McBean & Co.	a, c	2001 Los Feliz Blvd., Los Angeles	Gypsum
La Balsa Tile Co., A. W. Griffith	a, b, c	R.F.D. 1, Box 174, Huntington Beach	Smelter
Mission Clay Products Co.	a, b, c	Olive	Olive
Tierra Colorado Clay Co.	c	Box 473, San Juan Capistrano	San Juan Capistrano
<i>Placer County</i>			
Clay Corp. of Calif.	c	1267 Russ Bldg., San Francisco	Lincoln
Gladding, McBean & Co.	a, b, c	2001 Los Feliz Blvd., Los Angeles	Lincoln
Lincoln Clay Products Co., M. J. Dillman, Mgr.	c	Lincoln	Lincoln
<i>Riverside County</i>			
Alberhill Coal and Clay Co.	c	2406 E. 58th St., Los Angeles	Alberhill
C. R. Freeman	c	Courthouse, Riverside	Corona
Los Angeles Brick Co.	a, b, c	1078 Mission Rd., Los Angeles	Alberhill
Pacific Clay Products	c	680 Chamber of Commerce Bldg., Los Angeles	Corona
Temescal Clay Co.	c	5601 S. Eoye Ave., Los Angeles	Temescal
<i>Sacramento County</i>			
Cannon & Co.	a, b	Box 802, Sacramento	Ben Ali
H. C. Muddox, Jessie E. Muddox, Owner	a	301 and F Sts., Sacramento	Sacramento
Sanana Pottery Co.	a	R.F.D. 4, Box 1478, 24th St. Rd., Sacramento	Sacramento
Sacramento Brick Co.	b	1400 Front St., Sacramento	Sacramento
Valley Brick Co.	b	Box 1180, Sacramento	Sacramento
<i>San Benito County</i>			
D. L. Stewart Property, A. P. Stewart, Lessee	e	1052 Vermont, San Jose	Tres Pinos
<i>San Bernardino County</i>			
Mr. Walter Becker	e	Box 43, Red Mountain	Red Mountain
Chamberlain Co., Inc.	e	2550 E. 9th St., Los Angeles	Blanca
Hancock Brick Yard, C. P. Hancock & Son	b	4330 Lemon St., Riverside	Highgrove
Hart Clay Co., W. K. Skeoch, Lessor	b	2022 Thayer Ave., Los Angeles	Goffs
William M. Hewson	c	Box 336, Oro Grande	Oro Grande
Kennedy Clay Pit, John Kennedy	c	1306 1/4 Warren Ave., Los Angeles	Daggett
National Lead Co., Pigments & Chemical Div.	c	983 Wilson, Los Angeles	Hector
Pacific Coast Talc Co.	e	2149 Bay St., Los Angeles	Silver Lake
Standard Sanitary Mfg. Co., Pacific Mines, P. R. Jones, Mgr.	e	Campos	Hart
J. H. Stone	e	Barstow	Barstow
Temescal Clay Co.	d	5601 S. Boyle Ave., Vernon	Hicks

<i>San Diego County</i> Pacific Clay Products Co. Union Brick Co., J. W. Rice Vitrified Products Corp.	c b a, b, c	Box 145, Station A, Los Angeles 3565 3d St., North San Diego 2841 Jefferson St., North San Diego	Farr Station Rose Canyon North San Diego
<i>San Joaquin County</i> San Joaquin Brick Co., J. F. Stein, Secretary Stockton Brick & Tile Co.	b c	33, S. El Dorado St., Stockton McKinley Ave., Stockton	Stockton Stockton
<i>San Luis Obispo County</i> Antelope Mud Co., W. G. Angus, Mgr. San Luis Brick Works, Faustick Bros.	d b, d	Box 204, Lost Hills San Luis Obispo	Cholame San Luis Obispo
<i>San Mateo County</i> Richmond Potteries, Inc.	a	Box 187, South San Francisco	South San Francisco
<i>Santa Barbara County</i> McNall Building Materials Parker Brick Co., J. Y. Parker	a, b, c a, b	208 N. Salspuedes, Santa Barbara 303 Ladera St., Santa Barbara	Santa Barbara Santa Barbara
<i>Santa Clara County</i> Coyote Creek Clay Beds, L. R. Lenfest. Garden City Pottery Gladding Bros. Mfg. Co. Gladding Tile Co., L. W. Austin et al. Myers Ceramic Pottery, A. Clay Myer Remillard Brick Co. San Jose Brick Co. S. & L. Tile Co.	c a a, b, c a a b b, c a	1195 E. Santa Clara St., San Jose 560 N. 6th St., San Jose S. 3d and Keyes Sts., San Jose R.F.D. 2, Box 921A, San Jose Box 97, Santa Clara 569 3d St., Oakland Box 274, San Jose 1881 S. 1st St., San Jose	San Jose San Jose San Jose San Jose Santa Clara San Jose San Jose San Jose
<i>Sonoma County</i> Beltane Clay Deposit, Harry Weise Clay Corp. of Calif.	c c	Glen Ellen 1267 Russ Bldg., San Francisco	Beltane Glen Ellen
<i>Stanislaus County</i> Coopertown Clay Deposit, J. H. Hornsby	c	651 Cumberland St., Pittsburg	Coopertown
<i>Sutter County</i> Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Nicolaus
<i>Tulare County</i> San Joaquin Materials Co.	b	744 G St., Fresno	Exeter
<i>Ventura County</i> Robert Fraser Hercules Rotary Mud Co., Selby Shale Pit Peoples Lumber Co., C. E. Bonestel, Mgr. Shell Oil Co., Dent Clay Pit	d d a, b, c d	Ventura 2000 N. Ventura Ave., Ventura N. Ventura Ave., Ventura Shell Bldg., San Francisco	Ventura Ventura Ventura Ventura

* Plant destroyed by fire.
a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand. g. Ganister.

COAL

Operator	Remarks	Address	Location of mine
<i>Amador County</i> Buena Vista Coal Mine, Fred Harkness & Sons		R.F.D. 1, Box 60, Ione	Buena Vista
<i>San Benito County</i> M & R Coal Mine		R.F.D. 1, Box 81, Salinas	San Benito
<i>Trinity County</i> Tom Reese		Douglas City	Douglas City

COPPER

Principal Copper Producers in California during 1937

Mine	Operator	Address	Location of mine
<i>El Dorado County</i> Big Canyon	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle Springs
<i>Imperial County</i> American Girl	Socorro Mines, Inc.	Box 12, Ogilby	Ogilby
<i>Inyo County</i> Cardinal	Cardinal Gold Mining Co.	Bishop	Bishop
<i>Mono County</i> Silverado & Kentuck	Sierra Cons. Mines, Inc.	Wellington, Nevada	Sweetwater, Nev.
<i>Nevada County</i> Empire Star Group	Empire Star Mines Co., Ltd.	14 Wall St., Rm. 1507, New York, N. Y.	Grass Valley
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	Bradley Mining Co.	Crocker Bldg., San Francisco	Washington
<i>Plumas County</i> Walker	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walkermine
<i>San Bernardino County</i> Kelly	Frank Royer	Red Mountain	Red Mountain

DIATOMITE (DIATOMACEOUS EARTH)

Operator	Address	Location of quarry or mine
<i>Los Angeles County</i> The Dicalite Co..... Diatomaceous Earth Corp.....	756 S. Broadway, Los Angeles Walteria.....	San Pedro Walteria
<i>Monterey County</i> Pacatone, Ltd.....	Bradley.....	Bradley
<i>Santa Barbara County</i> Johns-Manville Products Corp..... Lompoc Mining Products, Inc.....	Lompoc..... Lompoc.....	Lompoc Lompoc

DOLOMITE

Operator	Address	Location of quarry
<i>Inyo County</i> Inyo Marble Co.....	726-732 E. 29th St., Los Angeles.....	Keeler
<i>Los Angeles County</i> W. F. Glasser, Inc.....	713 N. Sepulveda, Brentwood Heights, Los Angeles.....	Bel-Air
<i>Monterey County</i> Pacific Coast Steel Corp., Sterling Ranch Quarry.....	20th and Illinois Sts., San Francisco.....	Natividad
<i>San Benito County</i> Archie E. Hamilton.....	Hollister.....	Hollister

FELDSPAR

Operator	Address	Location of mine
<i>Fresno County</i> Industrial Minerals & Chemical Co.....	836 Gilman St., Berkeley.....	Friant
<i>San Diego County</i> Ames Grinding Co. Geo. Ames..... Standard Sanitary Mfg. Co., P. R. Jones, Mgr.....	2030 E. 52d St., Los Angeles Campo.....	Campo

FLUORSPAR

Operator	Address	Location of quarry or mine
<i>San Bernardino County</i> C. J. Whitlock.....	987 25th St., San Bernardino.....	Afton

GEMS

Operator	Variety	Address
W. C. Eyles..... Robert J. Graham..... H. F. Heather..... Pala Chief Mine, Margaret S. Moore and M. Wear.....	Orbicular and brecciated jasper and prase opal..... Iridescent obsidian..... Iceland-spar..... Tourmaline.....	2025 Foothill Blvd., Oakland Davis Creek 236 Oak Knoll Ave., Pasadena Box 33, Pala

GOLD

Principal gold producers in California out of a total of 1,751 placer operators and lode mines in 1937

Mine	Type of mine	Operator	Address	Location of mine
<i>Alpine County</i>				
Zaca	1	Zaca Mining Corporation	Markleeville	Markleeville
<i>Amador County</i>				
Argonaut	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco	Jackson
Arroyo Seco	e	Arroyo Seco Gold Dredging Co.	351 California St., San Francisco	Ione
Belden Amador	a	Belden Amador Mines, Inc.	Pine Grove	Pine Grove
Black Metal	a	Black Metal Mines Co.	Jackson	Jackson
Central Eureka & Old Eureka	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Sutter Creek
Central Eureka Dump	c	Central Tailings Co.	564 Market St., San Francisco	Sutter Creek
Comanche Dredge	e	Comanche Gold Dredging Co.	311 California St., San Francisco	Camanche
Delta Tailing Dump	c	Delta Tailings Co.	564 Market St., San Francisco	Ione
Farrell	a	Jose Porres	Jackson	Jackson
Fort Ann	a	J. C. Nimmo & F. W. Kent	Volcano	Volcano
Fremont-Gover	a	Fremont-Gover Co., and Amador Mother Lode Mng. Co.	Jackson	Drytown
Fuller	a	John J. Bernich & G. F. Fuller	Jackson	Jackson
Horton Ranch	a	H. G. Kreth	Ione	Ione
Kennedy	g	Kennedy Mining & Milling Co.	519 California St., San Francisco	Martell
Lancha Plana Dredge No. 3	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
McCullough Tailings	c	Ernest G. Rurup	2567 38th Ave., Oakland	Camanche
Mother Lode	a	Mother Lode Gold Mines, Inc.	Sutter Creek	Sutter Creek
Original Amador	a	Original Amador Gold Mines	Amador City	Amador City
Plymouth	a	Elwood Orr	Plymouth	Plymouth
River Pine	a	River Pine Mining Co.	618 3d St., San Rafael	Elk Grove
Valpariso	h	Valpariso Mining Co.	Jackson	Jackson
Wolin-Hall-Wackman	h	Wolin-Hall & Wackman	Elk Grove	Elk Grove
<i>Butte County</i>				
Briggs	e	Yuba Consolidated Gold Fields	351 California St., San Francisco	Rio Bonito
Coleman Property	h	Chas. Coleman & A. L. Schneider	Chico	Chico
Dageritt Land	h	Cinco Mineros Co.	Box 212, Oroville	Wyandotte
Consuelo	k	Max Hoffman	Oroville	Oroville
Four L.	a	A. J. Lindsey	Oroville	Oroville
Granelia Ranch	h	Penn. Dredging Co., A. B. Innis	1620 Bird St., Oroville	Chico
McCoy Ranch	a	Bill McCoy Dredging Co.	Chico	Forbestown
Midas (Forbestown)	e	Idaho Maryland Mines Corp.	Russ Bldg., San Francisco	Oroville
Richer & Sons Gold Dredge	h	Wm. Richter	R.F.D. 2, Box 318, Oroville	Oroville
Riley Estate	h	Western Dredging Co.	Oroville	Oroville
Ross & Sands Orchard	h	Butte Gold Dredging Co.	Oroville	Oroville
Skillin Property	k	Butte Mfg. & Development Co.	Chico	Chico
Success	a	Hoefling Bros.	1000 4th St., Sacramento	Yankee Hill
Swift Property	h	Fourells Co.	Oroville	Oroville
Truman Hill	e	Oroville Gold Dredging Co.	Oroville	Oroville

a. Lode gold mine. b. Placer (sluicing) mines. c. Pocket. d. Tailings dumps. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Copper-gold mine. k. Power shovel. l. Silver-gold mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,751 placer operators and lode mines in 1937

Mine	Type of mine	Operator	Address	Location of mine
<i>Calaveras County</i>				
Camanche Placers	e	Camanche Placers, Ltd.	Camanche	Camanche
Carson Hill	a	Carson Hill Gold Mining Corp.	Melones	Melones
Clear Creek	b	Milton Gold Dredging Enterprise	Milton	Milton
Easy Bird	e	Le Roi Mines, Inc.	Jackson	San Andreas
Esmond & James Properties	e	Wallace Dredging Co.	Stockton	Wallace
Folsom Dredge	k	A. R. Folsom	311 California St., San Francisco	
Golden River (Bishop)	f	Golden River Mining Co.		
Lancha Plana	f	Lancha Plana Gold Dredging Co.	649 S. Olive St., Los Angeles	Angels Camp
Lloyd	f	G. F. Sheekler	Camanche	Camanche
McKisson	a	Consolidated Mines of Calif.	621 W. Texas St., Stockton	San Andreas
Mother Lode Central	a	Mother Lode Central Mines, Inc.	506 Bay City Bldg., Santa Monica	Mokelumne Hill
Mountain King	a	Jumbo Cons. Mining Co.	Angels Camp	Angels Camp
Oro y plata	a	Orion Mining Co.	632 S. Spring St., Los Angeles	Copperopolis
Royal	a	Frank S. Tower	1092 Crocker Bldg., San Francisco	Murphys
South Gulch	h	E. L. Lilly	Milton	Milton
Vallecito Western	f	Vallecito Mining Co., Inc.	California Bldg., Stockton	Camanche
<i>El Dorado County</i>				
Beebe-Alpine	a	Beebe Gold Mining Co.	Crocker Bldg., San Francisco	Georgetown
Big Canyon	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle Springs
Big Canyon Dredge	h	Big Canyon Dredge	Shingle	Shingle Springs
Black Oak	a	Russell J. Wilson	Garden Valley	Garden Valley
Boulder	k	Jack Greaves	Pilot Hill	Pilot Hill
Carpender	f	Placers de Oro Co.	Box 214, Placerville	Placerville
General Utility	h	General Utility Corp.	Forum Bldg., Sacramento	Shingle
Kelsey	a	Kelsey Mining Co., Inc.	519 California St., San Francisco	Placerville
Lotus	k	R. A. Healy	Lotus	Lotus
Middle End	a	C. A. James Mines, Inc.	Grizzly Flat	Grizzly Flat
Rosenranz	a	Lodo Development Co.	Auburn	Auburn
Ruth Ann	h	Ruth A. Mines Co., B. F. Moggin	200 Financial Center Bldg., San Francisco	Folsom
Slicer	a	Middle Fork Gold Mining Co.	Box M, Auburn	Greenwood
Union	a	Monterey-Apex Mining Co.	Box M, Placerville	Placerville
Veerkamp Ranch	a	Gold Company, Ltd.	Garden Valley	Garden Valley
Vandalia	a	Page Consolidated Mng. Co.	Placerville	Shingle Springs
<i>Humboldt County</i>				
Pearch	g	Roy McGain	Orleans	Orleans
<i>Imperial County</i>				
American Girl	a	Socorro Mines, Inc.	Box 12, Ogilby	Ogilby
Cargo Muchacho Group	a	Holmes & Nicholson	Yuma, Arizona	Ogilby
Sovereign Group	a	Sovereign Development Co.	Ogilby	Ogilby
Tumaco Tallings	c	E. L. Ruggs	Ogilby	Ogilby

<i>Inyo County</i>	
American Eagle	
Cardinal	
Cleveland	
Copper Queen	
Silver Ball (Skidoo)	
Stockwell	
Ruth	
<i>Kern County</i>	
Big Blue	
Big Butte	
Big Dike	
Buckboard	
Cactus Queen	
Elephant-Starlight and Lodestar	
Golden Thread	
Golden Queen	
Keyes	
King Solomon	
Middle Butte	
National	
Operator	
Standard	
Sunshine	
Tropico	
Yellow Aster	
Yellow Dog	
<i>Los Angeles County</i>	
Allison	
Governor	
Big Suzanna	
<i>Mariposa County</i>	
Bondurant	
Champion	
Diltz	
Kumle & Ferris (Placer properties)	
Miner's Hope	
Mt. Gaines	
Nutting Dredge	
Original & Ferguson	
Our Chance	
Pine Tree, Josephine & French	
Pyramid	

a. Lode gold mine. b. Placer (sluicing) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-gold mine. k. Power shovel. l. Silver-gold mine.

F. N. Banta	Invokern	Invokern	Invokern
Cardinal Gold Mining Co.	Bin D. Bishop	Big Pine	Bishop Creek
T. L. Bright	Big Pine	Box 1556, Bakersfield	Big Pine
Gold Bottom Mines, Inc.	Whittier	Trona	Trona
W. B. Gray & Roy Jourigan	Trona	Box 627, Trona	Lone Pine
Century Mining Co.	Trona		Trona
N. W. Sweetser	Trona		Trona
Kern Mines, Inc.	Kernville	Kernville	Kernville
Butte Lode Mining Co.	1231 Roosevelt Bldg., Los Angeles	Mojave	Mojave
Shea, Benko & Miller	Randsburg	Randsburg	Randsburg
Paul E. Nelson & W. C. Wilkinson	Randsburg	Randsburg	Randsburg
Cactus Queen Mines Co.	Rosamond	Rosamond	Rosamond
Lodestar Mining Co.	Box 235, Mojave	Mojave	Mojave
Operator of Golden Thread Mine	Red Mountain	Red Mountain	Red Mountain
Golden Queen Mining Co.	Mojave	Mojave	Mojave
H. Lucas	Kernville	Kernville	Kernville
Mt. Gaines Mining Co.	183 N. Martel Ave., Los Angeles	Randsburg	Randsburg
Middle Butte Mines, Inc.	Rosamond	Rosamond	Rosamond
J. V. Creath	Rosamond	Rosamond	Rosamond
Operator Cons. Mines Co.	Randsburg	Randsburg	Randsburg
Standard Gold Mining Co.	Mojave	Mojave	Mojave
Anglo American Mng. Corp., Ltd.	Randsburg	Randsburg	Randsburg
Burton Bros., Inc.	Rosamond	Rosamond	Rosamond
Anglo American Mining Corp.	Randsburg	Randsburg	Randsburg
Mike Degraives and lessees	Mojave	Mojave	Mojave
V. F. Kirchoff	151 N. Florence St., Burbank	Anusa	Anusa
Governor Mining Co.	725 S. Figueroa, Los Angeles	Acton	Acton
Rogers & Gentry	Fairmont	Fairmont	Fairmont
Bondurant Mng. & Mng Syndicate	Coulterville	Coulterville	Coulterville
Carda Mining Co.	Box 54, Coulterville	Whitlock	Whitlock
E. R. Baker et al.	1518 14th St., Sacramento	Le Grand	Le Grand
Placer Properties Co., Inc.	Box 96, Le Grand	Mariposa	Mariposa
Whitlock Mines Corp.	Mariposa	Mariposa	Mariposa
Mt. Gaines Mining Co.	183 N. Martel Ave., Los Angeles	Hornitos	Hornitos
Nutting Dredging Co.	Le Grand	Le Grand	Le Grand
San Juan Ramsey Co.	Box 30, Incline	Incline	Incline
Our Chance Mining Co.	Mariposa	Mariposa	Mariposa
Pacific Mining Co.	Crocker Bldg., San Francisco	Bear Valley	Bear Valley
Pyramid Gold, Inc.	Grant Bldg., San Jose	Hornitos	Hornitos

GOLD—Continued

Principal gold producers in California out of a total of 1,751 placer operators and lode mines in 1937

Mine	Type of mine	Operator	Address	Location of mine
<i>Merced County</i>				
Merced	e	Merced Dredging Co.	Mills Tower, San Francisco	Le Grange
Merced Unit	e	Yuba Consolidated Gold Fields	351 California St., San Francisco	Snelling
San Joaquin Dredge No. 1	e	San Joaquin Mining Co.	1805 Mills Tower, San Francisco	Le Grange
Snelling	e	Snelling Gold Dredging Co.	Snelling	Snelling
<i>Mono County</i>				
Chemung	a	Conrad G. Monroe	Box 22, Bridgeport	Masonic
Silverado & Kentuck	l	Sierra Consolidated Mines, Inc.	Wellington, Nev.	Sweetwater, Nev.
Simpson	a	Mutual Gold Corp.	Leevining	Leevining
Standard	a	Roseknap Mines Co.	206 Sansome St., San Francisco	Bodie
<i>Napa County</i>				
Fallsades	l	Coast Range Mining Co.	Calistoga	Calistoga
<i>Nevada County</i>				
Atlas Gold Dredge	e	Atlas Gold Dredging Corp.	712 Edison Bldg., Los Angeles	Grass Valley
Bullion	a	Grass Valley Bullion Mines	Grass Valley	Grass Valley
Empire Star Group	a	Empire Star Mines Co., Ltd.	14 Wall St., Rm. 1507, New York, N. Y.	Grass Valley
Golden Center	a	Cooley Butler	745 Rowan Bldg., Los Angeles	Grass Valley
Hoge	a	Great Northern Gold Mines, Inc.	310 Broad St., New York, N. Y.	Nevada City
Idaho Maryland-Brunswick	a	Idaho Maryland Mines Corp.	Russ Bldg., San Francisco	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Norambagua	a	Campbell Grass Valley Mng. Co.	Box 1106, Grass Valley	Grass Valley
Reward Fraction	a	R. M. Bernard	Nevada City	Nevada City
Spanish	a	Bradley Mining Co.	922 Crocker Bldg., San Francisco	Washington
Spring Hill	a	Spring Hill Gold Mines, Inc.	1911 Mills Bldg., San Francisco	Grass Valley
Trude	k	Shovel Placer Co.	North Columbia	North Columbia
<i>Placer County</i>				
Alabama	a	Alabama California Gold Mines Co.	Box 155, Auburn	Penryn
Antelope Creek	e	Antelope Creek Dredging Co.	311 California St., San Francisco	Loomis
Auburn Chicago	a	Auburn Chicago Mining Co.	Citizens Nat'l Bank Bldg., Los Angeles	Penryn
Canyon (Rawhide)	a	Canyon Mines Corp.	144 Kearny St., San Francisco	Baxter
Doty Ravine	k	Pantle Bros. & F. O. Bohnett	Lincoln	Lincoln
Eclipse	a	Anderson & Weber	Auburn	Penryn
Fay Placer	h	Fay Placer Mine	Box 274, Lincoln	Lincoln
General Utility	h	General Utility Corp.	Forum Bldg., Sacramento	Roseville
Gold Blossom	a	A. L. Merritt	200 Bush St., San Francisco	Auburn
Herman	a	Gerald Maxfield	Forest Hill	Forest Hill
Lincoln	a	Lincoln Gold Dredging Co.	Box 334, Lincoln	Loomis and Lincoln
Lost Camp	h	Lost Camp Mining Co.	Auburn	Auburn
Oakwood	h	Oakwood Placer Mining Co.	Lincoln	Lincoln

Oro Bell.....	Oro Bell Dredging Co.....	Box 1051, Sacramento.....	Gold Run
Recap.....	Jasper-Stacy Co.....	216 Pine St., San Francisco.....	Lincoln
Ruben Johnson Ranch.....	Charles N. Chittenden.....	Box 644, Lincoln.....	Lincoln
Sera.....	Jurgens & Sparhawk.....	Roseville.....	Roseville
Thruo.....	E. B. Sticks.....	Auburn.....	Auburn
Gold Hill.....	W. Pitt Barnes.....	Iowa Hill.....	Iowa Hill
	Gold Hill Dredging Co.....	311 California St., San Francisco.....	Loomis
Plumas County			
Brilliant.....	General Mining Corp.....	Quincy.....	Quincy
Glacier.....	Wm. F. Booth & R. C. Foerster.....	57 Post St., San Francisco.....	Seneca
Imperial.....	Gerald R. Simpson.....	Quincy.....	Quincy
New York.....	Hammon Engineering Co.....	Balfour Bldg., San Francisco.....	Greenville
Virgilia.....	Virgilia Mining Corp.....	Virgilia.....	Virgilia
Walker.....	Walker Mining Co.....	821 Kearns Bldg., Salt Lake City, Utah.....	Walkermine
Riverside County			
Golden Rod.....	O. K. Mining Co.....	3325 E St., San Bernardino.....	Indio
Gold Crown.....	Gold Crown Mining Co., Ltd.....	730 Petroleum Securities Bldg., Los Angeles.....	Twenty-nine Palms
Smith.....	Cecil H. Smith.....	Mecca.....	Mecca
Sacramento County			
Biggs Ranch.....	Sacramento Gold Dredging Co.....	351 California St., San Francisco.....	Biggs Ranch
Capital.....	Capital Dredging Co.....	351 California St., San Francisco.....	Folsom
Cosumnes.....	Cosumnes Gold Dredging Co.....	351 California St., San Francisco.....	Slough House
Gold Hill.....	Gold Hill Dredging Co.....	311 California St., San Francisco.....	Folsom
Hoosier Gulch.....	Hoosier Gulch Placers.....	815 17th St., Sacramento.....	Sacramento
Narlyn.....	Marilyn Mng. Co.....	Folsom.....	Folsom
Natomas.....	Natomas Co.....	Box 1197, Sacramento.....	Natomas
Scott Ranch.....	Lord & Bishop.....	Box 812, Sacramento.....	Sacramento
San Bernardino County			
Carlyle Group.....	Carlyle Mining Co.....	463 S. Clark Dr., Beverly Hills.....	Twenty-nine Palms
Kelly.....	Frank W. Royer.....	606 Hill St., Los Angeles.....	Red Mountain
MacKesson.....	Thomas M. Hall & Wm. Rosenberg.....	Ludlow.....	Ludlow
Santa Fe.....	F. H. Lamley.....	Red Mountain.....	Red Mountain
San Joaquin County			
Wallace Dredge.....	Wallace Dredging Co.....	311 California St., San Francisco.....	Camanche
Shasta County			
A. C.....	A. C. Mining Co.....	Redding.....	Redding
Backbone.....	Backbone Gold Mining Co.....	Kennett.....	Kennett
Carlson & Sandburg.....	Carlson & Sandburg.....	Redding.....	Redding
China Gulch.....	Roy S. Olson.....	Redding.....	Redding
Dry Creek.....	Midland Co., Inc.....	733 Dwight Way, Berkeley.....	Cottonwood
Gold Acres Dredge.....	Gold Acres Dredging Co.....	Cottonwood.....	Cottonwood
Iron Mountain.....	The Mountain Copper Co., Ltd.....	351 California St., San Francisco.....	Matheson

a. Lode gold mine. b. Placer (sluicing) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-gold mine. k. Power shovel. l. Silver-gold mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,751 placer operators and lode mines in 1937

Mine	Type of mine	Operator	Address	Location of mine
<i>Shasta County—Continued</i>				
Midland Dredge	h	Midland Co., Inc.	733 Dwight Way, Berkeley	Cottonwood
Olney Creek	h	Golden State Dredging Co.	Redding	Redding
Pioneer	h	Pioneer Dredging Co.	Box 700, Redding	Cottonwood
Plummer	h	El Oro Dredging Co.	Cottonwood	Cottonwood
Roaring River	e	Roaring River Gold Dredging Co.	351 California St., San Francisco	Cottonwood
Walker	a	Star Gulch Mining Co.	Box 740, Redding	Redding
Yankee Jack	a	W. L. Hill	Redding	Redding
Halcyon	a	J. H. Scott Co.	Merchants Exchange Bldg., San Francisco	French Gulch
Taylor Dredge	k	Jim Taylor	Igo	Igo
<i>Sierra County</i>				
Bigelow	a	S. H. Gillespie	Sierra City	Sierra City
Depot Hill & Indian Hill	g	F. J. Joubert	Camptonville	Camptonville
Kenton	a	Gamble & Wilson	Alleghany	Alleghany
Oxford	a	Oxford Consolidated Mines Co.	314 17th St., Oakland	Downieville
Oriental	a	R. P. Hawkins	Alleghany	Alleghany
Plumbago	a	Socorro Mines, Inc.	Box 465, Ocean Beach	Alleghany
Ruby	a	C. L. Best	800 Davis St., San Leandro	Forest
Sierra Alaska	a	Sierra Alaska Mining Co.	Pike	Pike
Sixteen to One	a	Original 16 to 1 Mines, Inc.	1611 Russ Bldg., San Francisco	Alleghany
<i>Siskiyou County</i>				
Bonanza	a	R. C. Kramer	Forks of Salmon	Forks of Salmon
Cal Oro	e	Cal Oro Dredging Co.	681 Market St., San Francisco	Yreka
Gold Ball	a	Gold Ball Mining Co.	Sawyers Bar	Sawyers Bar
Grand National	a	Grand National Mining Co.	Callahan	Callahan
Ida May, Klamath Mountain, Laurel	a	Norcal Mining Co.	5427 E. Marginal Way, Seattle, Wash.	Sawyers Bar
King Solomon	a	King Solomon Mines Co.	Monte Vista, Colorado	Black Bear
McConnell Bar	a	W. D. Boulter	Yreka	Yreka
Siskiyou Unit	k	Yuba Consolidated Gold Fields	351 California St., San Francisco	Callahan
Yreka Dredge	e	Yreka Gold Dredging Co.	Balfour Bldg., San Francisco	Yreka
<i>Stanislaus County</i>				
La Grange	e	La Grange Dredging Co.	Mills Bldg., San Francisco	La Grange
<i>Trinity County</i>				
Arbuckle & Lorenz Ranch	h	Oro Trinity Dredging Co.	Box 212, Oroville	Weaverville
Brown Bear	a	Brown Bear Mines Corp.	Lewiston	Lewiston
Enterprise	a	Chilsan Oil Co.	401 Chapman Bldg., Fullerton	Helena
Indian Creek	h	Carlson & Sandburg	Redding	Redding
Junction City	e	Junction City Mining Co.	685 6th St., San Francisco	Junction City

Lewiston Dredge.....	Lewiston.....	Lewiston.....	Lewiston.....
Phillips.....	Redding.....	1225 Crocker First Nat'l Bank Bldg., San Francisco.....	Junction City.....
Red Hill.....	Red Hill.....	Lewiston.....	Lewiston.....
Trinity.....	Trinity Dredging Co., Mary E. Smith, Mgr.....	Weaverville.....	Weaverville.....
Williams & Crawford Ranch.....	Hayfork Gold Dredging Co.....	Hayfork.....	Hayfork.....
<i>Tuolumne County</i>			
Columbus.....	Columbus Gold Mining Co.....	1 Montgomery St., San Francisco.....	Tuolumne.....
Confidence.....	Confidence Gold Mining Co.....	405 Montgomery St., San Francisco.....	Sonora.....
Eagle-Shawmut.....	Miller & Clemson.....	4800 Santa Fe Ave., Los Angeles.....	Chinese Camp.....
Enterprise.....	Philip L. Small.....	Sonora.....	Sonora.....
Erin-Go-Bragh.....	California Standard Gold Mines Corp.....	Jamestown.....	Jamestown.....
Experimental.....	Shoestring Mining Co.....	Box 176, Columbia.....	Columbia.....
Hard Gravel.....	Premier Mining Co.....	111 Sutter St., San Francisco.....	Jamestown.....
Heslop.....	Gold Diggers Syndicate.....	Jamestown.....	Sonora.....
Jacks Hill.....	Charles Gillis.....	Sonora.....	Sonora.....
Kent Dredge.....	E. A. Kent.....	149 California St., San Francisco.....	Chinese Camp.....
Menke-Hess.....	Menke-Hess Gravels, Inc.....	Oakdale.....	Groveland.....
Mohrman.....	Chas. & Edwin Harper.....	Big Oak Flat.....	Columbia.....
Moccasin.....	Moccasin Mine.....	5220 21st Ave., Sacramento.....	
<i>Yuba County</i>			
Blue Point.....	Gold Exploration Mining Co.....	Smartville.....	Smartville.....
Garden Valley.....	F. O. Byhnett.....	San Jose.....	Woodleaf.....
Mt. De Oro.....	Mt. De Oro Mines Co.....	Woodleaf.....	Wheatland.....
Merilyn.....	Merilyn Mining Co.....	Box 195, Wheatland.....	Marysville.....
Williams Bar.....	Williams Bar Gold Dredging Co.....	Mills Bldg., San Francisco.....	Hamonton.....
Yuba.....	Yuba Consolidated Gold Fields.....	351 California St., San Francisco.....	Challenge.....
	Horseshoe Gold Mining Co.....	Challenge.....	

a. Lode gold mine. b. Placer (sluicing) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. j. Copper-gold mine. k. Power shovel. l. Silver-gold mine.

GRANITE

Operator	Product	Address	Location of quarry
<i>Fresno County</i> Academy Granite Superior Granite Co., Inc.	a a	Clovis Clovis	Clovis Academy
<i>Lassen County</i> A. D. Greig, Greig Quarry	a	Susanville	Susanville
<i>Los Angeles County</i> Binder Bros., W. H. Binder	d	285 N. Lake Ave., Pasadena	Boquet Canyon
<i>Madera County</i> McGillvray Raymond Corp.	a	3 Potrero Ave., San Francisco	Raymond
<i>Mariposa County</i> Yosemite National Park	a	Yosemite	Yosemite Park
<i>Nevada County</i> Netz Granite Quarry, Ludwig Netz	a	Nevada City	Nevada City
<i>Placer County</i> Victor Wickman	a	Rocklin	Rocklin
<i>Plumas County</i> Paul Sonognini	a	Chilcoot	Chilcoot
<i>Riverside County</i> Emil Johnson	a	Perris	Perris
<i>San Bernardino County</i> Texas Quarries, Inc., R. M. Richter	a	Rives-Strong Bldg., Los Angeles	Victorville
<i>San Diego County</i> American Marble & Granite Works Crystal Black Quarry, John Stridsburg Matson & Deering, Meyers Quarry Pacific Cut Stone & Granite Co.	a a a a	1212 E. Olympic Blvd., Los Angeles Escondido Lakeside 414 S. Marengo Ave., Alhambra	Santee Spooks Canyon Lakeside Escondido
<i>Sonoma County</i> S. Cabrol	b, c	Glen Ellen	Glen Ellen
<i>Ventura County</i> Ritchie Bros., R. A. Ritchie and J. A. Ritchie	a	Fillmore	Grimes Canyon

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone. d. Mica schist used as building stone.

GYPSUM

Operator	Address	Location of quarry
<i>Fresno County</i> Dos Palos Gypsum Co., O. L. Divens and A. A. Conrowe Green & Collins Paoli Gypsum Mine, A. P. Shepard, Mgr.	Dos Palos Ceres 3101 Mariposa St., Fresno	Dos Palos South Dos Palos Mendora
<i>Imperial County</i> Imperial Gypsum Quarry, Pacific Portland Cement	111 Sutter St., San Francisco	Plaster City
<i>Riverside County</i> U. S. Gypsum Co.	507 Architects Bldg., Los Angeles	Midland

IODINE

Operator	Address	Mine
<i>Los Angeles County</i> Deepwater Chemical Co., Ltd. I. O. Dow Chemical Co.	Box 588, Compton 310 Santiago Ave., Long Beach	Compton Long Beach

IRON

Operator	Address	Location of mine
<i>Inyo County</i> Hoot Owl Iron Deposit, Lloyd Helm L. S. McGirk	Inyokern Shoshone	Inyokern Shoshone
<i>San Bernardino County</i> Cave Canyon Iron Mine, A. S. Vinnell Co. Iron Hat Group, Tom Scofield	11 Westminster Ave., Alhambra Amboy	Baxter Cadiz

LEAD

Principal Lead Producers in California during 1937

Mine	Operator	Address	Location of mine
<i>Inyo County</i>			
Bunker Hill	Bunker Hill Mining Co.	Big Pine	Big Pine
Copper Queen	Gold Bottom Mines, Inc.	Box 1556, Bakersfield	Trona
Darwin Lead	Darwin Lead Co.	Darwin	Darwin
Golden Treasure	J. P. Madison & Ashford Bros.	Shoshone	Shoshone
Keystone	Darwin Keystone, Ltd.	Piru	Darwin
Ophir	C. O. Mittendorf	Randsburg	Trona
Royal Group	Cerro Gordo Ext. Mining Co.	Keeler	Keeler
Santa Rosa	Santa Rosa Mines Dev. Co., G. W. Dow, Trustee	Keeler	Keeler
Sure Contest	H. L. Eckloff	Keeler	Keeler
Ventura	Charles Baagoe	Box 156, Keeler	Keeler
Westgard	Mark Bradshaw	Laws	Laws
	L. D. Foreman & Co.	Darwin	Darwin
	Grant Snyder	Death Valley	Death Valley
<i>Mono County</i>			
Antimony	Earl Oxborrow	Topaz	Topaz
<i>Nevada County</i>			
Empire Star Group	Empire Star Mines Co., Ltd.	14 Wall St. Rm. 1507, New York, N. Y.	Grass Valley
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	Bradley Mining Co.	Crocker Bldg., San Francisco	Washington
<i>San Bernardino County</i>			
Carbonate	P. F. Hillwig	Oro Grande	Oro Grande
Carlisle Group	Carlisle Mining Co.	463 S. Clark Dr., Beverly Hills	Twentynine Palms
Iron Horse	Tony Martiletti	China	China

LIME AND LIMESTONE

Operator	Product	Address	Location of quarry
<i>Alameda County</i> Westvaco Chlorine Prod. Corp.-----	a, d	Newark-----	Newark
<i>El Dorado County</i> Auburn Chemical Lime Co., Ltd.-----	a, b	Auburn-----	Newcastle
Diamond Springs Lime Co.-----	a, b	Diamond Springs-----	Diamond Springs
El Dorado Limestone Co., J. H. Bell, Pres.-----	b, c	Shingle Springs-----	Shingle Springs
Pac. Portland Cement Co., Cons.-----	b	111 Sutter St., San Francisco-----	Auburn
<i>Fresno County</i> Mt. Campbell Lime Co., R. C. Finck, Mgr.-----	c, e	Dinuba-----	Reedley
<i>Los Angeles County</i> W. F. Glasser, Inc.-----	b	713 N. Sepulveda, Brentwood Heights, Los Angeles-----	
<i>San Bernardino County</i> Cal. Portland Cement Co.-----	a	601 W. 5th St., Los Angeles-----	Colton
Chubbuck Lime Co., Chas. I. Chubbuck-----	a, b, c	500 Worth St., Los Angeles-----	Chubbuck
Pacific Coast Talc Co.-----	b	2149 Bay St., Los Angeles-----	Silver Lake
Victorville Lime Rock Co.-----	b	2424 Enterprise St., Los Angeles-----	Victorville
<i>San Luis Obispo County</i> Charles Taylor-----	b	Salinas-----	Cambria
<i>San Mateo County</i> Pacific Portland Cement Co.-----	c, d	111 Sutter St., San Francisco-----	San Mateo
<i>Santa Clara County</i> Bay Shell Co.-----	c, d	503 Market St., San Francisco-----	Alviso
L. H. Beck-----	c, d	Box 113, Colma-----	Alviso
California Lime Marl Fertilizer Co.-----	c, e	R.F.D. 1, Box 684, San Jose-----	Edenvale
W. B. Ortle Shell Co.-----	d	Alviso-----	Alviso
<i>Santa Cruz County</i> Basico Limestone Products Co.-----	a, b	625 Market St., San Francisco-----	Santa Cruz
Henry Cowell Lime and Cement Co., W. H. George, Mgr.-----	a, b	2 Market St., San Francisco-----	Santa Cruz
Pacific Limestone Prod. Co.-----	b	Spring St., Santa Cruz-----	Santa Cruz
<i>Sonoma County</i> J. F. Bishop-----	a	Box 501, Santa Rosa-----	Geyserville
<i>Tuolumne County</i> McLean Quarry, W. S. McLean-----	a	419 Bayshore Blvd., San Francisco-----	Columbia
U. S. Lime Products Corp.-----	a, b	38 Sutter St., San Francisco-----	Sonora

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells. e. Marl.

MAGNESITE

Operator	Address	Location of mine
<i>Santa Clara County</i> Westvaco Chlorine Prod. Corp., Lessee, Western Magnesite Mine	Newark	Red Mountain
<i>Stanislaus County</i> Westvaco Chlorine Prod. Corp., Lessee, Bald Eagle Mine	Newark	Gustine

MAGNESIUM SALTS

Operator	Product	Address	Location of plant
<i>San Diego County</i> Westvaco Chlorine Prod. Corp.	Chloride	Newark	San Diego
<i>San Mateo County</i> Marine Chemical Co., R. E. Clarke	Carbonate hydroxide and oxide	South San Francisco 537 Brannan St., San Francisco	South San Francisco Redwood City
Plant Rubber & Asbestos Works	Carbonate		

MARBLE (Including Onyx and Travertine)

Operator	Product	Address	Location of quarry
<i>Los Angeles County</i> W. F. Glasser, Inc.	b	713 N. Sepulveda, Los Angeles	Brentwood Heights
<i>San Bernardino County</i> Onyx Mine, John Olsen & Pete Logan. Howard Small	c c	Whitewater 311 Main St. Riverside	
<i>San Luis Obispo County</i> Reynolds Quarry, Thomas C. Reynolds	b	Box 53, Paso Robles	Paso Robles
<i>Santa Barbara County</i> G. Antolini	b	111 E. Gutierrez St., Santa Barbara	Tijiguas
<i>Tuolumne County</i> Columbia Marble Co.	a	Columbia, Tuolumne County	Columbia

a. Marble. b. Limestone, building and flagstone. c. Onyx and travertine.

MICA

Operator	Variety	Address	Location of property
<i>Imperial County</i> Mica Tale Co., Inc.	Mica schist	2808 S. Pacific Blvd., San Pedro	Ogilby
<i>Mariposa County</i> Sierra Minerals Co.	Sericite	Le Grand	Le Grand

MINERAL PAINT

Operator	Address	Location of property
<i>Nevada County</i> Dempsey Ranch Deposit, N. L. Wimmier & Peterson	74 New Montgomery St., San Francisco	Waddles
<i>Placer County</i> Synthetic Iron Color Co.	Richmond	Forest Hill
<i>Yuba County</i> Dempsey Ranch Deposit, N. L. Wimmier & Peterson	74 New Montgomery St., San Francisco	Strawberry Valley

MINERAL WATER

Operator	Address	Location of spring
<i>Butte County</i> Feather River Canyon Spring Water Co., R. E. Chappell. Richardson Springs, Lee Richardson, Mgr.	2215 L St., Sacramento Chico.	Pulga Chico
<i>Calaveras County</i> Mok-Hill Mineral Springs, L. Walkmeister	Sutter Creek.	Sutter Creek
<i>Colusa County</i> Cooks Springs, D. D. Markham.	Lodoga.	Cooks Springs
<i>Contra Costa County</i> Alhambra Water Co.	Martinez.	Martinez
<i>El Dorado County</i> Digger Indian Natural Medicine Water Co.	Randall P.O.	Randall
<i>Lake County</i> Adams Mineral Springs, Clarence Prather. The Majestic Bottling Co. Norman Mineral Springs, H. C. Norman, Mgr. Witter Medical Springs, W. E. Whitaker.	Adams, via Middletown. 20 Beideman St., San Francisco Middletown. 995 Market St., San Francisco.	Adams Bartlett Springs Middletown Witter Springs
<i>Los Angeles County</i> Cascade Water Co. Deep Rock Artesian Water Elysian Spring Water Co. Frespuo Artesian Water Holly Spring Water Magnetic Spring Water Co. Mission Spring Water Co. Mountain Spring Water Co. Pure-lax Mineral Water Co. Sparklett Bottled Water Co.	4556 York Blvd., Los Angeles 4416 York Blvd., Los Angeles 1536 Baxter, Los Angeles 4430 York Blvd. 2298 Holly Dr., Los Angeles 938 Palen Ave., Sherman 8938 Keith, Hollywood 228 S. Alhambra St., Los Angeles 2640 Griffith, Los Angeles 4500 York Blvd., Los Angeles.	Los Angeles Los Angeles Los Angeles Los Angeles Los Angeles Los Angeles Hollywood Los Angeles Los Angeles
<i>Marin County</i> Purity Spring Water Co.	2032 Kearny St., San Francisco.	
<i>Napa County</i> Calistoga Bottling Works, E. E. Hardies Napa Soda Springs Co., G. H. T. Jackson. Napa Vichy Springs, V. Frugoli. Samuels Soda Springs, Mrs. Robert J. Little.	Calistoga 315 Montgomery St., San Francisco. 228 Bay St., San Francisco. Monticello.	Calistoga Napa Napa Monticello

<i>Riverside County</i>	Arlington.....	Arlington
Beulah Springs, Oscar C. McNicholl.....		
<i>San Bernardino County</i>		
Arrowhead Hot Springs, Calif. Cons. Water Co.....	1566 E. Washington Blvd., Los Angeles.....	Arrowhead
<i>San Diego County</i>		
Cuyamaca Mineral Water, San Diego Ice & Cold Storage Co.....	67 8th St., San Diego.....	San Diego
Rock Springs Co., E. S. Walck.....	R.F.D. 2, Box 442, Escondido.....	Escondido
<i>San Francisco County</i>		
Blue Crest Beverage Co., Morris & Paul Greenberg.....	265 Naples St., San Francisco.....	San Francisco
Diamond Rock Spring Water Co., L. Paolinelli.....	247 Naples St., San Francisco.....	San Francisco
<i>San Luis Obispo</i>		
Crystal Spring Water Co., W. R. Hudson.....	R.F.D. 2, Box 11, San Luis Obispo.....	San Luis Obispo
<i>Santa Barbara County</i>		
Veronica Mineral Springs Co.....	699 Brannan St., San Francisco.....	Santa Barbara
<i>Siskiyou County</i>		
The Shasta Water Co.....	6th and Brannan Sts., San Francisco.....	Dunsmuir
Yreka Coco Cola Bottling Works, Fred J. Meamber, Prop.....	Yreka.....	Little Shasta
<i>Sonoma County</i>		
Agua Caliente Springs Co., T. H. Corcoran, Prop.....	Agua Caliente.....	Agua Caliente
Barcal Springs, John Kolling.....	Preston.....	Preston
Boyes Springs Mineral Water Co.....	Boyes Springs.....	Boyes Springs
Fetters Mineral Springs, George Fetters.....	Fetters Springs.....	Fetters Springs

PLATINUM

Principal Platinum Producers in California in 1937

Operator	Address	Location of mine
<i>Amador County</i> Comanche Gold Dredging Co.....	311 California St., San Francisco.....	Camanche
<i>Butte County</i> Yuba Cons. Goldfields Co.*.....	351 California St., San Francisco.....	Rio Bonito
<i>Merced County</i> Merced Dredging Co..... San Joaquin Mining Co..... Yuba Consolidated Gold Fields*.....	Mills Bldg., San Francisco..... 1805 Mills Tower, San Francisco..... 351 California St., San Francisco.....	Snelling Snelling Snelling
<i>Placer County</i> Gold Hill Dredging Co.....	311 California St., San Francisco.....	Loomis
<i>Sacramento County</i> Capital Dredging Co.*..... Natomas Co.*.....	Balfour Bldg., San Francisco..... Forum Bldg., Sacramento.....	Folsom Natomas
<i>Shasta County</i> Elcote Dredging Co., B. M. Stites..... Elcote Dredging Co., Verne H. Carter..... Gold Mines Dredging Co., F. G. Flumerfelt..... The Midland Co..... Roaring River Gold Dredging Co.....	Cottonwood..... Cottonwood..... 638 Haddon Rd., Oakland..... 733 Dwight Way, Berkeley..... 351 California St., San Francisco.....	Cottonwood Cottonwood Cottonwood Cottonwood Cottonwood
<i>Trinity County</i> Hayfork Dredging Co..... Junction City Mining Co.....	Hayfork..... Junction City.....	Hayfork Junction City
<i>Yuba County</i> Yuba Consolidated Gold Fields*.....	351 California St., San Francisco.....	Hammonton

*Platinum metals not sold in 1937.

POTASH

Operator	Address	Location of plant
<i>San Bernardino County</i> American Potash and Chemical Co.....	Trona.....	Trona

PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of quarry
<i>Imperial County</i> Chamberlain Co., Inc.	a	2550 E. 9th St., Los Angeles	Calipatria
<i>Inyo County</i> Chas. Brown	a	Shoshone	Shoshone
Little Lake Pumice Co.	a	1204 S. Monterey St., Alhambra	Coso Junction
Red Mountain Cinder Quarry, H. P. Thelan	b	Little Lake	Little Lake
Tonopah & Tidewater Ry.	b	510 W. 6th St., Los Angeles	Shoshone
<i>Kern County</i> Cudahy Packing Co.	b	803 Macy St., Los Angeles	Ceneda
<i>Madera County</i> Elmer Erickson	a	Friant	Friant
Friant Pumicite Co., Earl R. Carper	a, b	816 Pacific Southwest Bldg., Fresno	Friant
<i>Mariposa County</i> Sierra Minerals Co.	a	Le Grande	Le Grande
<i>Napa County</i> C. Cicero	a	4241 23d St., San Francisco	Monticello
<i>San Luis Obispo County</i> Red Eagle Mine, M. L. Francis	b	Creston	Creston
<i>Siskiyou County</i> Avisstone Corp. or E. Bear	a	2800 Board of Trade Bldg., Chicago, Ill., 1600 Golden Gate Ave., San Francisco	Pumice Mt.
G. Z. Johnson	a	255 California St., San Francisco	Pumice Mt.
Volcanic Products Co., Ray N. Fouch	a	1111 Alameda Ave., Klamath Falls, Ore.	Glass Mt.
Dan A. Williams	a	217 Monterey St., Salinas	Mt. Hoffman

a. Pumice. b. Volcanic ash.

PYRITE

Operator	Address	Location of mine
<i>Shasta County</i> Mountain Copper Co., Wm. F. Kett, Mgr.	351 California St., San Francisco	Matheson

QUICKSILVER

Principal Quicksilver Producers in California for 1937, out of a Total of 65 Operating Properties

Mine	Operator	Address	Location of mine
<i>Colusa County</i> Wide Awake Mine.....	A. A. Gibson.....	Wilbur Springs.....	Wilbur Springs
<i>Contra Costa County</i> Mt. Diablo.....	Bradley Mining Co.....	Crocker Bldg., San Francisco.....	Clayton
<i>Fresno County</i> Archer.....	Joseph Byles & Sons.....	Coalinga.....	Coalinga
<i>Inyo County</i> Coso Hot Springs.....	J. F. Sanders.....	Little Lake.....	Little Lake
<i>Kern County</i> Cuddeback.....	Walabu Mining Co.....	Box 1168, Bakersfield.....	Keene
<i>Lake County</i> Anderson Mine.....	Albert Baker & D. Strickler.....	Middletown.....	Anderson Springs
Great Western.....	Bradley Mining Co.....	Crocker Bldg., San Francisco.....	Middletown
Helen Mine.....	L. S. Peterson (Lessee).....	Middletown.....	Middletown
Mirabel.....	Mirabel Quicksilver Co.....	Middletown.....	Middletown
Sulphur Bank.....	Bradley Mining Co.....	Crocker Bldg., San Francisco.....	Lower Lake
<i>Monterey County</i> G. W. D. Mine.....	T. E. Washburn.....	Box 785, Coalinga.....	Parkfield
Patriquin Mine.....	W. M. Gootschalk (Owner).....	609 Mills Bldg., San Francisco.....	Parkfield
<i>Napa County</i> La Joya.....	La Joya Quicksilver Mine, Morgan North, Mgr.....	Oakville.....	Oakville
Manhattan Mine.....	Chas. Wilson & W. M. Hickox.....	Monticello.....	Monticello
Oat Hill.....	Oat Hill Mine, Inc., R. A. Hanan, Secy.-Treas.....	369 Pine St., San Francisco.....	Oat Hill
Oat Hill Extension.....	Zack Anderson.....	Middletown.....	Oat Hill
<i>San Benito County</i> Aurora.....	San Benito Mining Co., Ltd.....	Box 38, Le Grand.....	Idria
Florence Mac Mine.....	R. Orozco et al., Rex Smith, Mgr.....	San Benito.....	Hernandez
New Idria.....	New Idria Quicksilver Mining Co.....	Mills Bldg., San Francisco.....	Idria
Stayton Quicksilver Mine.....	R. B. Knox.....	Hollister.....	Hollister

<i>San Luis Obispo</i>				
Josephine Mine.....	C. C. Thompson.....	Paso Robles.....	Adelaide.....	Adelaide
Klau.....	Klau Mine, Inc.....	Mills Bldg., San Francisco.....	Adelaide.....	Adelaide
Oceanic.....	Anglo American Mining Corp.....	Mills Bldg., San Francisco.....	Cambridge.....	Cambridge
Rinconada.....	Theresa L. Bell, Owner.....	Santa Margarita.....	Santa Margarita.....	Santa Margarita
<i>Santa Barbara County</i>				
Lion Den.....	Cal Mer Co., c/o P. B. De Mandel.....	Box 634, Santa Barbara.....	Los Olivos.....	Los Olivos
Los Prietos.....	T. H. Canfield.....	Box 277, Santa Barbara.....	Santa Barbara.....	Santa Barbara
Red Rock.....	Santa Ynez Mercury Co., Hans Peters, Pres.....	Solvang.....	Solvang.....	Solvang
<i>Santa Clara County</i>				
Guadalupe Mine.....	Laco Mining Co., H. N. Mason.....	R.F.D. 3, Box 412, Los Gatos.....	Los Gatos.....	Los Gatos
Little Almaden.....	Quicksilver Mining Co., P. R. Schneider.....	Los Gatos.....	Almaden.....	Almaden
New Almaden Dump.....	Ben Black, Owner.....	Almaden.....	Almaden.....	Almaden
<i>Sonoma County</i>				
Cloverdale.....	Cloverdale Quicksilver Mine, Att. Mr. George H. Burr.....	Cloverdale.....	Cloverdale.....	Cloverdale
Culver Bear.....	C. A. Baumber.....	Cloverdale.....	Cloverdale.....	Cloverdale
<i>Trinity County</i>				
Altoona.....	Altoona Q. Mining Co., J. Frowenfeld, Pres.....	2446 Washington St., San Francisco.....	Castella.....	Castella
<i>Yolo County</i>				
Harrison Mine.....	J. W. Abercrombie, et al.....	Middletown.....	Rumsey.....	Rumsey

SALT

Operator	Address	Location of plant
<i>Alameda County</i> Leslie Salt Co.....	310 Sansome St., San Francisco.....	Newark and Mt. Eden
<i>Imperial County</i> Imperial Salt Co.....	4000 E. Washington Blvd., Los Angeles.....	Calipatria
<i>Kern County</i> Long Beach Salt Co.....	P.O. Box 28, Long Beach.....	Saltdale
<i>Los Angeles County</i> Long Beach Salt Co.....	P.O. Box 28, Long Beach.....	Long Beach
<i>Madoc County</i> Surprise Valley Salt Works, Joshua H. Hutchinson.....	Box 26, Cedarville.....	Lake City
<i>Monterey County</i> Monterey Bay Salt Co., E. C. Vierra, Mgr.....	Moss Landing.....	Moss Landing
<i>Orange County</i> Irvine Salt Co.....	Tustin.....	Tustin
<i>San Bernardino County</i> California Rock-Salt Co..... Rock Salt Products Co.....	2465 Hunter St., Los Angeles..... 845 El Centro St., South Pasadena.....	Amboy Salt Marsh
<i>San Diego County</i> Western Salt Co.....	1245 National Ave., San Diego.....	San Diego
<i>San Mateo County</i> Stauffer Chemical Co.....	636 California St., San Francisco.....	Redwood City

SANDSTONE

Operator	Address	Location of quarry
<i>Los Angeles County</i> R. L. Glover.....	917 W. 6th St., Los Angeles.....	Chatsworth.....
<i>Monterey County</i> Carmel Stone Quarry, A. L. Possadori..... Sierra Quarry, H. E. Rogers..... Andrew Stewart.....	Carmel..... Box 136, Carmel..... Carmel Valley.....	Carmel..... Carmel..... Carmel Valley.....
<i>Sonoma County</i> S. Cabrol.....	Glen Ellen.....	Glen Ellen.....

11—64347

SILICA

Operator	Product	Address	Location of mine
<i>Contra Costa County</i> Hazel-Atlas Glass Co. of California, Ltd..... Silica Co. of California, Ltd.....	b b	89th and G St., Oakland..... Brentwood.....	Summersville Brentwood
<i>Monterey County</i> Del Monte Properties—Att. C. S. Olmsted.....	b	Del Monte.....	Del Monte
<i>Riverside County</i> P. J. Wiesel, Inc.....	b	La Habra.....	Corona
<i>San Bernardino County</i> Temescal Clay Co.....	c	5601 S. Boyle Ave., Los Angeles.....	Hicks
<i>San Diego County</i> Standard Sanitary Mfg. Co., R. P. Jones, Mgr.....	a	Campo.....	Campo

SILIMANITE-ANDALUSITE-CYANITE GROUP

Operator	Product	Address	Location of mine
<i>Imperial County</i> Vitrefrax Co.....	Kyanite	500 Pacific St., Vernon, Los Angeles.....	Ogilby
<i>Mono County</i> Champion Spark Plug Co., Ceramio Division.....	Andalusite	Butler Ave. and Grand Trunk R.R., Detroit, Mich.....	Mocalno

a. Quartz. b. Glass sand. c. Quartzite.

SILVER

Principal Silver Producers in California during 1937

Mine	Type of mine	Operator	Address	Location of mines
<i>Alpine County</i>				
Zaca.....	b	Zaca Mining Corp.	Markleville.....	Markleville
<i>Amador County</i>				
Argonaut.....	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco.....	Jackson
Central Eureka & Old Eureka.....	a	Central Eureka Mining Co.	111 Sutter St., San Francisco.....	Sutter Creek
Kennedy.....	a	Kennedy Mining & Milling Co.	519 California St., San Francisco.....	Nartell
<i>Butte County</i>				
Surcasse.....	a	Hoefling Bros.	2801 C St., Sacramento.....	Yankee Hill
<i>Calaveras County</i>				
Carson Hill.....	a	Carson Hill Gold Mining Corp.	Melones.....	Melones
<i>El Dorado County</i>				
Big Canyon.....	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco.....	Shingle Springs
<i>Imperial County</i>				
American Girl.....	a	Socorro Mines, Inc.	Box 12, Ogilby.....	Ogilby
<i>Inyo County</i>				
Cardinal.....	a	Cardinal Gold Mining Co.	Bin D. Bishop.....	Bishop Creek
Copper Queen.....	a	Gold Bottom Mines, Inc.	Box 1536, Bakersfield.....	Trona
Darwin Lead.....	c	Darwin Lead Co.	Darwin.....	Darwin
Estelle.....	c	Estelle Mines Corp.	972 S. 4th Ave., Los Angeles.....	Keeler
Golden Treasure.....	c	J. P. Madison & Ashford Bros.	Shoshone.....	Shoshone
Keystone.....	c	Darwin-Keystone, Ltd.	Pru.....	Darwin
Ophir.....	c	S. O. Mitterdorf.....	Randsburg.....	Trona
Santa Rosa.....	c	Santa Rosa Mines Dev. Co.	Keeler.....	Keeler
Last Chance Claims.....	c	L. D. Foreman & Co.	Darwin.....	Darwin
<i>Kern County</i>				
Big Blue.....	a	Kern Mines, Inc.	Kernville.....	Kernville
Cactus Queen.....	c	Cactus Mines Co.	Rosamond.....	Rosamond
Elephant, Starlight & Lodestar.....	d	Lodestar Mining Co.	Box 235, Mojave.....	Mojave
Golden Queen.....	a	Golden Queen Mining Co.	Mojave.....	Mojave
Karna.....	b	E. L. Wegman.....	Mojave.....	Mojave
Middle Butte.....	a	Middle Butte Mines, Inc.	Rosamond.....	Rosamond
Tropico.....	a	Burton Bros., Inc.	Rosamond.....	Rosamond
Yellow Aster.....	a	Anglo-American Mining Corp.	Randsburg.....	Randsburg

<i>Mariposa County</i>	a	Mt. Gains Mining Co.	183 N. Martel Ave., Los Angeles.	Hornitos
<i>Mono County</i>	a	Pacific Mining Co.	Crocker Bldg., San Francisco.	Bear Valley
<i>Napa County</i>	b	Roseklip Mining Co.	206 Sansome St., San Francisco.	Bodie
<i>Nevada County</i>	a	Sierra Consolidated Mines, Inc.	Wellington, Nev.	Sweetwater, Nev
<i>Placer County</i>	b	Coast Range Mining Co.	Calistoga.	Calistoga
<i>San Bernardino County</i>	a	Empire Star Mines Co., Ltd.	14 Wall St., Rm. 1507, New York, N. Y.	Grass Valley
<i>Shasta County</i>	a	Cooley Butler.	Rowan Bldg., Los Angeles.	Grass Valley
<i>Sierra County</i>	a	Idaho Maryland & Brunswick	Russ Bldg., San Francisco.	Grass Valley
<i>Tulare County</i>	a	Lava Cap Mining Corp.	Box 780, Nevada City.	Nevada City
<i>Yuba County</i>	a	Bradley Mining Co.	922 Crocker Bldg., San Francisco.	Washington
<i>Alameda County</i>	a	Alabama California Gold Mines Co.	Box 155, Auburn.	Penryn
<i>Auburn County</i>	a	Auburn Chicago Mines Corp.	Citizens National Bank Bldg., Los Angeles.	Penryn
<i>Walker County</i>	g	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah.	Walkermine
<i>Riverside County</i>	a	Gold Crown Mining Co., Ltd.	730 Petroleum-Security Bldg., Los Angeles.	Twenty-nine Palms
<i>Sacramento County</i>	e	Natomas Co.	Forum Bldg., Sacramento.	Natomas
<i>San Bernardino County</i>	h	Edwin A. Bergman et al.	Yermo.	Yermo
<i>Calico Tailsings</i>	b	Cardyle Mining Co.	463 S. Clark Dr., Beverly Hills.	Twenty-nine Palms
<i>Comanche</i>	b	J. B. Osborn.	Daggett.	Daggett
<i>Imperial</i>	b	Mojave Mining Co., Ltd.	Ludlow.	Ludlow
<i>Kelly</i>	d	Frank Royer.	606 Hill St., Los Angeles.	Red Mountain
<i>Old Barber Mill</i>	h	Simon Bacon.	Barstow.	Barstow
<i>Santa Fe</i>	b	F. H. Lamley.	Red Mountain.	Red Mountain
<i>Silver King</i>	h	A. H. Mayne.	Barstow.	Barstow
<i>Venus.</i>	b	Harold E. Brown.	Ludlow.	Ludlow
<i>Shasta County</i>	a	Backbone Gold Mining Co.	Kennett.	Kennett
<i>Iron Mountain</i>	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco.	Matheson
<i>Sierra County</i>	a	Original 16 to 1 Mine, Inc.	1611 Russ Bldg., San Francisco.	Alleghany
<i>Yuba County</i>	c	Yuba Consolidated Gold Fields.	351 California St., San Francisco.	Hammonton

a. Gold mine. b. Gold-silver mine. c. Lead-silver mine. e. Gold dredge. f. Silver-lead-zinc mine. g. Copper mine. h. Tailings dump.

SLATE

Operator	Product	Address	Location of quarry
<i>Calaveras County</i> Pacific Slate Products Corp., Att. Hollis B. Peek	a, c	Rittenhouse Bldg., Santa Cruz	Copperopolis
<i>El Dorado County</i> Pacific Minerals Co., Ltd. Geo. S. Pitcock & Son, Ltd., Losh Property	b c	337 10th St., Richmond 1298 Hopkins St., Berkeley	Chili Bar Placerville
<i>Inyo County</i> Mt. Whitney Slate Quarries, R. B. Melroy Red Slate Quarry, J. D. Leary	b, c c	Star R.F.D. No. 291, Lone Pine Keeler	Lone Pine Keeler
<i>Los Angeles County</i> Blue Goose Quarry, Robert Cox	c	1975 Lundy Ave., Pasadena	Pasadena
<i>Tuolumne County</i> Whitney Slate Quarry, W. S. McLean Estate	b	419 Bayshore Blvd., San Francisco	Hetch Hetchy

a. Roofing. b. Granules. c. Flagging.

SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
<i>Butte County</i> McLean Talc Deposit, W. S. McLean Est.	a	419 Bayshore Blvd., San Francisco	McLean Spur
<i>El Dorado County</i> Industrial Minerals & Chemical Co. Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.	a a	836 Gilman St., Berkeley 337 10th St., Richmond	Latrobe Shrub
<i>Inyo County</i> St. Whitney Talc Deposit, Pacific Coast Talc Co. Sierra Talc Co., Franklin Booth, Mgr. Southern Calif. Minerals Co., W. S. Skeoch	b b b	2149 Bay St., Los Angeles 428 Union League Bldg., Los Angeles 320 Mission Rd., Los Angeles	Darwin Keeler Kingston Mt.
<i>Los Angeles County</i> Binder Bros., W. H. Binder	a	285 N. Lake Ave., Pasadena	Bouquet Canyon
<i>San Bernardino County</i> Pacific Coast Talc Co. Southern Calif. Minerals Co., W. S. Skeoch Western Talc Co.	b b b	2149 Bay St., Los Angeles 320 Mission Rd., Los Angeles 1901 E. Slauson Ave., Los Angeles	Silver Lake Kingston Mt. Acme

a. Soapstone. b. Talc.

SODA

Operator	Product	Address	Location of plant
<i>Inyo County</i> Natural Soda Products Co. Pacific Alkali Co.	a, b, d a	405 Montgomery St., San Francisco 1206 Pacific Mutual Bldg., Los Angeles	Keeler Bartlett
<i>San Bernardino County</i> American Potash & Chemical Co. West End Chemical Co.	a, c a	Trona Latham Square Bldg., Oakland	Trona West End

a. Soda Ash. b. Sodium Bicarbonate. c. Salt Cake. d. Trona.

STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produce both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
<i>Alameda County</i>			
California Rock & Gravel Co.	a	500 Call Bldg., San Francisco	Livermore
Farmers Land Co., Ltd.	a	922 A St., Hayward	Hayward
Healey-Moore Co., Leona Quarry	a, b	344 High St., Oakland	Oakland
Henry L. Kaiser Co.	a, b	1522 Latham Square Bldg., Oakland	Radum
Langdon Molding Sand, J. H. Langdon	c	R. F. D., Box 89, Niles	Decoto
Red Shale Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	Arroyo Mocho
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Eliot and Niles
Alfred W. Petersen	a, b	Box 943, Livermore	Livermore
Thos. B. Russell Quarry, T. B. Russell	b	1192 Russell Way, Hayward	Hayward
San Leandro Rock Co., Lake Chabot Quarry	b	2485 Washington St., San Leandro	Lake Chabot
Southern Pacific R.R. Co., Asst. Chief Engineer	a, b	Southern Pacific Bldg., San Francisco	Eliot, Niles, Radum
<i>Butte County</i>			
Bechtel-Kaiser Co., R. J. Kennedy, Mgr.	a, b	Oroville	Oroville
Cherokee Sand and Gravel Co., E. E. Meyers	a	R. F. D. 4, Box 127, Chico	Cherokee Flat
J. E. Johnson Rock Co.	b	Weber Ave. and E St., Stockton	Chico
McLean's Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	McLean Spur
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oroville
<i>Calaveras County</i>			
Pacific Minerals Co., Ltd.	d	337 10th St., Richmond	Angels
<i>Contra Costa County</i>			
Antioch Asphalt Sand Co.	a	2008 Mission St., San Francisco	Antioch
Basalt Rock Co.	a	8th St., Napa	Antioch
Blake Bros. Co., Anson Blake	b	204 Balboa Bldg., San Francisco	Point Richmond
Hutchinson Co., Stege Quarry	b	329 17th St., Oakland	Stege
Henry J. Kayser Co.	a	1522 Latham Square Bldg., Oakland	Newlove
Oak Point Sand Co., Robert P. Easley, et al.	a	Antioch	Antioch
Ed Roberts	c	Pittsburg	Pittsburg
Silica Co. of Calif., Ltd.	c	Brentwood	Brentwood
Southern Pacific R.R. Co., Asst. Chief Engineer	a	Southern Pacific Bldg., San Francisco	Newlove
E. Stamm	a	Antioch	Antioch
<i>El Dorado County</i>			
Diamond Springs Lime Co.	b	Diamond Springs	Diamond Springs

<i>Fresno County</i>	Central Rock & Sand Co.	Sanger	Sanger	Sanger
	Grant-Service Rock Co., Cons.	T. W. Patterson Bldg., Fresno	El Prado	El Prado
	Pacific Coast Aggregates, Inc.	85 2d St., San Francisco	Piedra	Piedra
<i>Glenn County</i>				
	Southern Pacific Co.	65 Market St., San Francisco	Wyo	Wyo
	E. B. Bishop	Box 325, Orland	Wyo	Wyo
<i>Humboldt County</i>				
	D. A. Boyd	R. F. D., Arcata	Arcata	Arcata
	Hemstreet & Bell	411 C St., Marysville	Garberville	Garberville
<i>Imperial County</i>				
	R. M. Albree	Holtville	Holtville	Holtville
	Imperial Rock Corp.	3232 E. 50th St., Vernon, Los Angeles	Niland	Niland
<i>Inyo County</i>				
	Inyo Marble Co.	726-732 E. 29th St., Los Angeles	Lone Pine	Lone Pine
<i>Kern County</i>				
	American Minerals Co.	2808 S. Pacific, San Pedro	Cantil	Cantil
	Bakersfield Rock and Gravel Co.	Box 395, Station A, Bakersfield	Bakersfield	Bakersfield
	Kern Rock Co., Ltd.	Box 1897, Bakersfield	Kern River	Kern River
	G. A. Padfield	120 4th St., Bakersfield	Bakersfield	Bakersfield
<i>Lake County</i>				
	Chas. Kuppinger	Lakeport	Lakeport	Lakeport
<i>Lassen County</i>				
	Red River Lumber Co.	Westwood	Westwood	Westwood
<i>Los Angeles County</i>				
	Arroyo Rock Co.	Box 155, Monrovia	Monrovia	Monrovia
	A. T. & S. F. R. L. L. Hibbard, Gen. Mgr.	609 Keworth Bldg., Los Angeles	Forbes	Forbes
	Angus Rock & Sand Co.	R. F. D., Azusa	Azusa	Azusa
	Richard R. Ball	Box 233, Walnut	Walnut	Walnut
	Blue Diamond Corp., Ltd.	1650 S. Alameda St., Los Angeles	El Monte	El Monte
	Wm. J. Bonfield	2008 Laurel Canyon Rd., Los Angeles	Hollywood	Hollywood
	Chandler Pulver & Sons, S. & G. L. Chandler	2730 S. Alameda St., Los Angeles	Loma	Loma
	Consolidated Rock Products Co.	Box 194, East Pasadena	Whittier and Fullerton	Whittier and Fullerton
	Dacey & Atwood Rock Co., R. K. Atwood, Pres.	2350 E. Colorado St., Pasadena	East Pasadena	East Pasadena
	Eastern Canyon Rock and Sand Co.	713 N. Sepulveda, Brentwood Heights, Los Angeles	Pasadena	Pasadena
	W. F. Glaser, Inc.	3425 Fowler Ave., Los Angeles	Brentwood Heights	Brentwood Heights
	Graham Bros.		Catalina Island and	Catalina Island and
	Granite Material Co.	8200 Tujunga Ave., Roscoe	Roscoe	Roscoe
	Haines Canyon Rock Co., John M. Ferry	5201 San Fernando, Glendale	Glendale	Glendale

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>Los Angeles County—Continued</i>			
Lindauer Corp.	a	Box 208, La Habra.	La Habra
Los Angeles Dept. of Water and Power	a	207 S. Broadway, Los Angeles	Los Angeles
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	Los Angeles
Pacific Rock & Gravel Co.	a, b	458 S. Spring St., Los Angeles	Los Angeles
Reynolds Crushed Gravel	b, g	920 N. Humphreys Ave., Los Angeles	Catalina Island
Rohl-Connolly Co.	b	4351 Alhambra Ave., Los Angeles	Lomita
Edwin Sidebotham & Son, Inc., Sidebotham Sand Plant.	a	McFarland and L Sts., Wilmington	Los Angeles
State Decomposed Granite Co.	g	2272 Laurel Canyon Blvd., Los Angeles	Azusa
West Slope Construction Co.	b	Avalon	Catalina Island
Wrigley Company	b		
<i>Madera County</i>			
Southern Pacific R.R. Co., Asst. Chief Engineer	b	Southern Pacific Bldg., San Francisco	Knowls
Stewart & Nuss	b	410 Throne St., Fresno	Herndon
<i>Marin County</i>			
Daniels Const. Co.	b	503 Market St., San Francisco	San Rafael
Hutchison Co.	b	329 17th St., Oakland	San Quentin
<i>Mariposa County</i>			
Yosemite National Park	a, b	Yosemite	Yosemite Nat'l Park
<i>Mendocino County</i>			
Hemstreet & Bell	b	411 C St., Marysville	Laytonville
Ukiah Gravel & Cement Co., John Freitas	a	Ukiah	Ukiah
<i>Merced County</i>			
Fred Bagsdale	a, b	Merced	Merced
Frank B. Marks	a, b	Newman	Los Banos
<i>Modoc County</i>			
Cline Porter	b	Alturas	Alturas
<i>Mono County</i>			
L. A. Bureau of Water Works and Supply	a	207 S. Broadway, Los Angeles	Mono Craters
<i>Monterey County</i>			
Del Monte Properties, C. S. Olmsted	a, c	Del Monte	Del Monte
M. J. Murphy	b	Monte Verde and 9th Sts., Carmel	Carmel
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Lapis and Pratto
S. Ruthven, Seaside Sand Pit	a	Seaside	Seaside
Southern Pacific Co.	a	65 Market St., San Francisco	Lapis

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STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>San Bernardino County</i>			
A. T. & S. F. R.R.	a	609 Kerckhoff Bldg., Los Angeles	Gale Upland
Commercial Rock Co.	a, b	14th and Campus, Upland	La Verne
Consolidated Rock Products Co.	a	2730 S. Alameda St., Los Angeles	San Bernardino
Hanawalt Bros.	a, b	2151 D St., La Verne	Barstow
Fourth Street Rock Crusher, A. O. Johnson	a	San Bernardino	Redlands
Pacific Minerals, Inc.	d	337 10th St., Richmond	San Bernardino
Redlands Gravel Co.	a, b	Redlands	San Bernardino
San Bernardino Rock & Gravel Co.	a, b	Box 249, San Bernardino	Decezville
Southern Pacific R.R. Co., Asst. Chief Engineer	b	Southern Pacific Bldg., San Francisco	San Bernardino
Triangle Rock & Gravel Co.	a, b	San Bernardino	
<i>San Diego County</i>			
Calaveras Materials Co.	b	Oceanside	Oceanside
Canyon Rock Co.	a, b	3911 5th Ave., San Diego	San Diego
Crystal Silica Sand Co.	a	Oceanside	Oceanside
H. G. Fenton Material Co.	a	13th and Imperial Ave., San Diego	San Diego
R. M. Hubbard	c	406 W. Nutmeg St., San Diego	San Diego
Nelson & Sloan	a	Box 832, Chula Vista	Chula Vista
Oceanside Rock & Sand Co.	a	Carlsbad	Oceanside
<i>San Francisco County</i>			
Mission Quarry Co.	b	210 Balboa Bldg., San Francisco	San Francisco
<i>San Joaquin County</i>			
G. F. Gillett	a	205 W. Vine St., Stockton	Stockton
Frank Marks	a	Newman	Tracy
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Santa Fe Sand and Gravel Co., W. A. Arlington	a	Box 271, Escalon	Escalon
Elmer J. Warner	a	1128 E. Roosevelt St., Stockton	Stockton
<i>San Luis Obispo County</i>			
Gulton Molding Sand, Harold E. Gulton	c	Oceano	Oceano
Walter B. Roselip	a	615 Grand Ave., San Luis Obispo	San Luis Obispo
Gularte Gravel Pit, M. Gularte	a	Santa Margarita	Santa Margarita
<i>San Mateo County</i>			
Golden West Quarry	b	South San Francisco	South San Francisco
Industrial Mineral Products, W. B. Vestal, Pres.	c	400 7th St., San Francisco	
Market Street Ry. Co., Daly's Quarry	b	58 Sutter St., San Francisco	Daly City

<i>Santa Barbara County</i> Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
<i>Santa Clara County</i> Carroll Gravel Pit, R. D. Carroll	a	R.F.D. 4, Box 310A, San Jose	San Jose
Jas. A. Lemieux	a	Box 341, Senter Rd., San Jose	San Jose
Los Gatos Sand and Gravel Co.	a	Los Gatos	Los Gatos
Pacific Coast Sand and Gravel Co.	a, b	85 2d St., San Francisco	Coyote and Campbell
Rhodes & Robinson, Stanford Quarry	b	Box 325, Palo Alto	Palo Alto
Henry Sand	a	1018 Malone Rd., San Jose	San Jose
City of San Jose	a	San Jose	San Jose
Southern Pacific Co.	a	65 Market St., San Francisco	Coyote
Taffie Construction Co.	b	Los Altos	Los Altos
<i>Santa Cruz County</i> Central Supply Co.	a	Box 524, Santa Cruz	Santa Cruz
Henry F. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Olympia
Pacific Limestone Products Co.	b	Santa Cruz	Santa Cruz
<i>Shasta County</i> Dietschhorst Gravel Plant, Chas. Dietschhorst	a, b	1040 Liberty St., Redding	Redding
Lassen Volcanic Nat'l Park, Superintendent	b	Mineral via Red Bluff	Lassen Nat'l Park
Oaks Gravel Plant, G. E. Oaks	a	1341 Yuba St., Redding	Girvan
Southern Pacific R.R. Co., Asst. Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kennett
<i>Sierra County</i> Henstreet & Bell	b	411 C St., Marysville	Downieville
<i>Stakey County</i> King Solomon Mines Co.	f	Crocker Bldg., San Francisco	Black Bear
W. D. Miller Cons. Co.	a	Box 168, Klamath Falls, Ore.	Graham Siding
Southern Pacific R.R. Co., Asst. Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kegg
A. Young	a	345 N. Main St., Yreka	Yreka
<i>Solano County</i> J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
<i>Sonoma County</i> Beaht Rock Co.	a	8th St., Napa	Healdsburg
Hain Bros. Bealt Rock Co., Mark Hain, Pres.	b	Petaluma	Petaluma
Petaluma and Santa Rosa, E. R. R., E. H. Maggard, Mgr.	b	Petaluma	Stony Point
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Route	Stony Point
<i>Stanislaus County</i> W. Haslam	a	Oakdale	Oakdale
Frank B. Marks	a	Newman	Newman
Oakdale Irrigation Dist.	a	Oakdale	Oakdale
Puman Sand and Gravel Co.	a	Modesto	Modesto
Reichert Sand Pit, Reichart Bros.	a	Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Grows Landing
Southern Pacific Co.	a	65 Market St., San Francisco	Newman
Chas. Warner	a	Modesto	Modesto

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder.
f. Tubemill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>Trinity County</i> S. Eastwood.....	a	Douglas City.....	Douglas City
<i>Tulare County</i> J. J. Dugan & Sons..... P. C. Jeffers..... Pacific Coast Aggregates, Inc..... Porterville Cement Pipe Co.....	a a a, b a	R. F. D. 2, Box 120, Porterville..... Star Rt. 2, Porterville..... 85 2d St., San Francisco..... Box 396, Porterville.....	Porterville Porterville Lemon Cove and Lindsay Porterville
<i>Tuolumne County</i> Beerman & Jones.....	b	Soulsbyville.....	Soulsbyville
<i>Ventura County</i> G. W. Dryden..... El Rio Rock Co..... Montalvo Rock Co..... Piru Rock Co..... Santa Paula Rock Co..... Saticoy Rock Products Co..... J. S. Toler..... Southern Pacific Co.....	b a, b a a, b a, b a, b c a, b	Fillmore..... Box 381, Ventura..... Box 188, Montalvo..... Piru..... Willard Bridge, Santa Paula..... Ventura..... 1257 Poli St., Ventura..... 65 Market St., San Francisco.....	Grimes Canyon El Rio Montalvo Piru Santa Paula Saticoy-Ventura Ventura Rockbank and Chrisman
<i>Yolo County</i> Leroy Kerr..... Frank Newman..... Joe Schwarzgruber..... George Summers..... Yolo Gravel Co.....	a a a a a	Yolo..... Woodland..... Woodland..... Woodland..... Box 7, Yolo.....	Yolo Woodland Woodland Woodland Yolo
<i>Yuba County</i> Hemstreet & Bell..... N. F. Mahle..... Pacific Coast Aggregates, Inc..... Yuba River Sand Co.....	a, b a a a	501 11th St., Marysville..... 715 D St., Marysville..... 85 2d St., San Francisco..... Marysville.....	Marysville Marysville Marysville Marysville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

SULPHUR

Operator	Address	Location of mine
<i>Los Angeles County</i> Sulphur Diggers, G. H. Burns, Mgr. Sulphur Products Co.	9172 Sunset Blvd., Hollywood 1427 E. 4th St., Los Angeles	Last Chance Mts. Last Chance Mts.

TUNGSTEN

Mine	Operator	Address	Location of mine
<i>Inyo County</i> Pine Creek Rossi Tungsten City Tungsten City	U. S. Vanadium Company, A. P. Cortelyou Bishop Tungsten Company, A. T. Wilkerson El Diablo Mining Company, H. O. Johanson Tungsten Milling Co., Raymond A. Stolle	Bishop Bishop Kernville Box 461, Bishop	Bishop Bishop Bishop Bishop
<i>Kern County</i> Randsburg Winnie	Jennie E. Daly	Box 47, Cantil	Randsburg
<i>San Bernardino</i> Atolia Adelanto	Atolia Mining Co. Nicholas Baxter	1022 Crocker Bldg., San Francisco 1316 Perris St., San Bernardino	Atolia Adelanto
<i>Tulare County</i> Tungsten	Tungsten Mines	929 American Ave., Long Beach	Posey

ZINC
Producers of Zinc in California during 1937

Mine	Operator	Address	Location of mine
<i>Inyo County</i> Thorndyke.....	Johnson & Young.....	Trona.....	Trona
<i>San Bernardino County</i>	C. A. Simons.....	Needles.....	Needles

ZIRCON

Mine	Operator	Address	Location of mine
<i>Placer County</i> Kaufeld Dredge.....	F. L. Newsome and E. M. Kaufeld.....	533 23d Ave., San Francisco.....	Lincoln

APPENDIX

MINING BUREAU ACT

Chap. 670 [Stats. 1913]; amended, Chap. 280 [Stats. 1929]; amended, Chap. 748 [Stats. 1933].

An act establishing a state mining bureau, creating the office of state mineralogist, fixing his salary and prescribing his powers and duties; providing for the employment of officers and employees of said bureau, making it the duty of persons in charge of mines, mining operations and quarries to make certain reports, providing for the investigation of mining operations, dealings and transactions and the prosecution for defrauding, swindling and cheating therein, creating a state mining bureau fund for the purpose of carrying out the provisions of this act and repealing an act entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, who shall have the direction, management and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all acts amendatory thereof and supplemental thereto or in conflict herewith.

[Approved June 16, 1913. In effect August 10, 1913.]

[Amendment (Sec. 16) approved May 14, 1929. In effect August 14, 1929.]

[Amendment (Sec. 10) approved June 5, 1933. In effect August 21, 1933.]

The people of the State of California do enact as follows:

SECTION 1. There is hereby created and established a state mining bureau. The chief officer of such bureau shall be the state mineralogist, which office is hereby created.

SEC. 2. It shall be the duty of the governor of the State of California and he is hereby empowered to appoint a citizen and resident of this state, having a practical and scientific knowledge of mining, to the office of state mineralogist. Said state mineralogist shall hold his office at the pleasure of the governor. He shall be a civil executive officer. He shall take and subscribe the same oath of office as other state officers. He shall receive for his services a salary of three hundred dollars (\$300) per month, to be paid at the same time and in the same manner as the salaries of other state officers. He shall also receive his necessary traveling expenses when traveling on the business of his office. He shall give bond for the faithful performance of his duties in the sum of ten thousand dollars (\$10,000), said bond to be approved by the governor of the State of California.

SEC. 3. Said state mineralogist shall employ competent geologists, field assistants, qualified specialists and office employees when necessary in the execution of his plans and operations of the bureau, and fix their compensation. The said employees shall be allowed their necessary traveling expenses when traveling on the business of said department and shall hold office at the pleasure of said state mineralogist.

SEC. 4. It shall be the duty of said state mineralogist to make, facilitate, and encourage, special studies of the mineral resources and mineral industries of the state. It shall be his duty: to collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use; to make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance, such collection constituting the museum of the state mining bureau; to provide a library of books, reports, drawings, bearing upon the mineral industries, and sciences of mineralogy and geology, and arts of mining and metallurgy, such library constituting the library of the state mining bureau; to make a collection of models, drawings and descriptions of the mechanical appliances used in mining and metallurgical processes; to preserve and so maintain such collections

and library as to make them available for reference and examination, and open to public inspection at reasonable hours; to maintain, in effect, a bureau of information concerning the mineral industries of this state, to consist of such collections and library, and to arrange, classify, catalogue, and index the data therein contained, in a manner to make the information available to those desiring it; to issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this state.

SEC. 5. It is hereby made the duty of the owner, lessor, lessee, agent, manager or other person in charge of each and every mine, of whatever kind or character, within the state, to forward to the state mineralogist, upon his request, at his office not later than the thirty-first day of March, in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men then employed, the method of working such mine and the general condition thereof, the total mineral production for the past year, and such owner, lessor, lessee, agent, manager or other person in charge of any mine within the state must furnish whatever information relative to such mine as the state mineralogist may from time to time require for the proper discharge of his official duties. Any owner, lessor, lessee, agent, manager or other person in charge of each and every mine of whatever kind or character within the state, who fails to comply with the above provisions shall be deemed guilty of a misdemeanor.*

SEC. 6. The state mineralogist now performing the duties of the office of state mineralogist shall perform the duties of the office of state mineralogist as in this act provided until the appointment and qualification of his successor as in this act provided.

SEC. 7. The said state mineralogist shall take possession, charge and control of the offices now occupied and used by the board of trustees and state mineralogist and the museum, library and laboratory of the mining bureau located in San Francisco as provided for by certain act of the legislature approved March 23, 1893, and hereafter referred to in section fourteen hereof, and shall maintain such offices, museum, library and laboratory for the purposes provided in this act.

SEC. 8. Said state mineralogist or qualified assistant shall have full power and authority at any time to enter or examine any and all mines, quarries, wells, mills, reduction works, refining works and other mineral properties or working plants in this state in order to gather data to comply with the provisions of this act.

SEC. 9. The state mineralogist shall make a biennial report to the governor on or before the fifteenth day of September next preceding the regular session of the legislature.

SEC. 10. All moneys received by the State Mining Bureau (or State Division of Mines) or any officer thereof, from sales of publications issued by said bureau, shall be deposited at least once each month in the State treasury to the credit of a fund which is hereby created and designated "Division of mines revolving printing fund." Said fund shall be used and is hereby appropriated for the use of said bureau in addition to such other funds as may be from time to time appropriated by the Legislature, for the printing and publishing of reports, bulletins, and maps issued by the said bureau. The State Controller is authorized to require financial reports from the State Mining Bureau or any officer thereof.

SEC. 11. The said state mineralogist is hereby authorized and empowered to receive on behalf of this state, for the use and benefit of the state mining bureau, gifts, bequests, devises and legacies of real or other property and to use the same in accordance with the wishes of the donors, and if no instructions are given by said donors, to manage, use, and dispose of the gifts and bequests and legacies for the best interests of said state mining bureau and in such manner as he may deem proper.

SEC. 12. The state mineralogist may, whenever he deems it advisable, prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the state.

SEC. 13. The state mineralogist is hereby empowered to fix a price upon and to dispose of to the public, at such price, any and all publications of the state mining bureau, including reports, bulletins, maps, registers or other publications, such price shall approximate the cost of publication and distribution. Any and all sums derived from such disposition, or from gifts or bequests made, as hereinbefore pro-

* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."

vided, must be accounted for by said state mineralogist and turned over to the state treasurer to be credited to the mining bureau fund as provided for in section ten. He is also empowered to furnish without cost to public libraries the publications of the bureau and to exchange publications with other geological surveys and scientific societies, etc.

SEC. 14. The state mineralogist provided for by this act shall be the successor in interest of the board of trustees of the state mining bureau, and the state mineralogist, under and by virtue of that certain act, entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, who shall have the direction, management, and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all books, papers, documents, personal property, records, and property of every kind and description obtained or possessed, or held or controlled by the said board of trustees of the said state mining bureau, and the state mineralogist, and the clerks and employees thereof, under the provisions of said act of March 23, 1893, or any act supplemental thereto or amendatory thereof, shall immediately be turned over and delivered to the said state mineralogist herein provided for, who shall have charge and control thereof.

SEC. 15. That certain act entitled, "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, and to provide for the appointment, duties and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction, and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, together with all acts amendatory thereof and supplemental thereto and all acts in conflict herewith are hereby repealed.

SEC. 16. For the purpose of this act and as used herein the term "mine" is hereby defined to embrace and include all mineral bearing properties of whatever kind or character whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained, and the term "mineral" for the purposes of this act and whenever so used shall embrace and include any and all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

DEPARTMENT OF NATURAL RESOURCES ACT

Chap. 128 [Stats. 1927]; amended, Chap. 307 [Stats. 1929.]

An act to add a new article to chapter three of title one of part three of the Political Code to be numbered article two j, embracing sections three hundred seventy-three to three hundred seventy-three i, relating to a department of natural resources.

[Approved by the Governor April 13, 1927.]

[Amendment approved May 18, 1929.]

The people of the State of California do enact as follows:

SECTION 1. The Political Code is hereby amended by adding a new article to chapter III of title I of part III thereof, to be numbered article IIj, embracing sections 373 to 373i and to read as follows:

ARTICLE IIj.

DEPARTMENT OF NATURAL RESOURCES

373. A department of the government of the State of California to be known as the department of natural resources is hereby created. The department shall be conducted under the control of an executive officer to be known as the director of natural resources, which office is hereby created. The director shall be appointed by and hold office at the pleasure of the governor and shall receive a salary of six thousand dollars per annum.

Except as in this article otherwise provided, the provisions of article II of this chapter, title, and part of the Political Code as adopted at the forty-fourth session of the Legislature and as the same may be amended from time to time, shall govern and apply to the conduct of the department of natural resources in every respect the same as if such provisions were herein set forth at length and wherever in said article II the term "head of the department" or similar designation occurs, the same shall for the purposes of this article mean the director of natural resources.

373a. For purposes of administration the department shall be forthwith organized by the director thereof, subject to the approval of the governor, in such manner as he shall deem necessary to properly segregate and conduct the work of the department, and the director shall have power to appoint, in accordance with the civil service and other provisions of law, such deputies, officers and other expert and clerical assistants as may be necessary. The work of the department is hereby divided into at least four divisions to be known as the division of forestry, the division of parks, the division of fish and game, and the division of mines.

373b. The division of mines shall be administered through a chief who shall be appointed by the director of natural resources upon the nomination of the state mining board, the chief to be a technically trained mining engineer and to be known as the state mineralogist; such chief shall receive a salary of six thousand dollars per annum. General policies for the guidance of the division of mines shall be determined by a board to be known as the state mining board, which shall consist of five members appointed by and to hold office at the pleasure of the governor.

373c. The division of forestry shall be administered through a chief of division who shall be known as the state forester, who shall be a technically trained forester, appointed by the director of natural resources upon nomination by the state board of forestry hereinafter provided. General policies for the guidance of the division of forestry shall be determined by a state board of forestry which shall consist of seven members appointed by and holding office at the pleasure of the governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with the live stock industry, one with general agriculture and one with the problems of water conservation.

373d. The division of parks shall be administered through a chief of division who shall be appointed by the director of natural resources upon nomination by the state park commission hereinafter provided. General policies for the administration of the state park system shall be determined by the state park commission which is hereby created to consist of five members appointed by the governor and holding office at his pleasure.

373e. The division of fish and game shall be administered through a fish and game commission consisting of three members appointed by and holding office at the pleasure of the governor.

373f. The chiefs of the divisions of forestry and parks respectively shall receive such salaries as may be determined by the director with the approval of the governor. The director of natural resources and the chief of each division before entering upon his duties shall execute to the State of California an official bond in the penal sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties. The members of the board of forestry, the state parks commission and fish and game commission shall serve without compensation, but shall be entitled to their actual expenses incurred in the performance of their duties.

373g. The department of natural resources shall succeed to and is hereby invested with all the duties, powers, purposes, responsibilities and jurisdiction of the state mining bureau, state mineralogist, department of petroleum and gas, state oil and gas supervisor, state forester, state board of forestry, California redwood park commission, San Pasqual battlefield commission, Mount Diablo park commission, state fish and game commission, state fish and game commissioners, and, except as herein otherwise provided, of the several officers, deputies and employees of such bodies and offices, and whenever by the provisions of any statute or law now in force or that may hereafter be enacted a duty or jurisdiction is imposed or authority conferred upon any of said officers, offices, bodies, deputies or employees by any statute the enforcement of which is transferred to the department, such duty, jurisdiction and authority are hereby imposed upon and transferred to the department of natural resources and the appropriate officers thereof with the same force and effect as though the title of said department of natural resources had been specifically set forth and named therein in lieu of the name of any such body, office, officer, deputy or employee. Said bodies and offices, the duties, powers, purposes, responsibilities and jurisdiction of which are so transferred and vested in the department of natural resources, and the positions of all officers, deputies and employees thereunder, are and each of them is hereby abolished and shall have no further legal existence, but the statutes and laws under which they existed and all laws prescribing their duties, powers, purposes, responsibilities and jurisdiction, together with all lawful rules and regulations established thereunder are hereby expressly continued in force.

The department of natural resources shall be in possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other property real or personal now or hereafter held for the benefit or use of said bodies, offices and officers.

The boards of district oil and gas commissioners, the offices of district oil and gas commissioners and the board of review, correction and equalization created by the act approved June 10, 1915, establishing the department of petroleum and gas, are hereby respectively continued in force with the powers, duties, responsibilities and jurisdiction in them vested by the provisions of said act approved June 10, 1915, as amended; *provided*, that said board of review shall consist of the director of natural resources, the director of finance and the chairman of the state board of equalization.

373h. The management and control of the property acquired by the State of California under or pursuant to the provisions of the act entitled "An act to accept the gift to the state of San Pasqual battlefield in San Diego county, to provide for collecting and systematizing the history of said battle, for determining the exact location thereof, and to report a suitable method of marking said battlefield and commemorating the heroism of those Americans who fought and died there," approved May 11, 1919, is hereby transferred to and vested in the department of natural resources.

373i. From and after the date upon which this act takes effect, the department of natural resources shall be and is hereby authorized and empowered to expend the moneys in any appropriation or in special fund in the state treasury now remaining or made available by law for the administration of the provisions of all the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office or officer whose duties, powers, and functions are, by the provisions of this article, transferred to and conferred upon the department of natural resources. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which such appropriations were made or such special funds created.

PUBLICATIONS OF THE DIVISION OF MINES

During the past fifty-six years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available for reference, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco; State Building, Los Angeles; State Office Building, Sacramento; Redding; and Division of Oil and Gas at Santa Barbara, Taft, Bakersfield, Coalinga. They may also be found in many public, private and technical libraries in California and other states and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained postpaid by addressing any of the above offices and enclosing the requisite amount in the case of publications that have a list price. Only coin, stamps or money orders should be sent, and it will be appreciated if remittance is made in this manner rather than by personal check.

Money orders should be made payable to the Division of Mines.

NOTE.—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.

REPORTS

Asterisks (**) indicate the publication is out of print.

PRICES SUBJECT TO CHANGE. WRITE FOR LATEST PRICE LIST

	Price Postpaid
**First Annual Report of the State Mineralogist, 1880, 43 pp. Henry G. Hanks -----	
**Second Annual Report of the State Mineralogist, 1882, 514 pp., 4 illustrations, 1 map. Henry G. Hanks -----	
**Third Annual Report of the State Mineralogist, 1883, 111 pp., 21 illustrations. Henry G. Hanks -----	
**Fourth Annual Report of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks -----	
**Fifth Annual Report of the State Mineralogist, 1885, 234 pp., 15 illustrations, 1 geological map. Henry G. Hanks -----	
Sixth Annual Report of the State Mineralogist, Part I, 1886, 145 pp., 3 illustrations, 1 map. Henry G. Hanks -----	\$0.75
Part II, 1887, 222 pp., 36 illustrations. William Ireland, Jr. -----	.75
**Seventh Annual Report of the State Mineralogist, 1887, 315 pp. William Ireland, Jr. -----	
**Eighth Annual Report of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Ireland, Jr. -----	
**Ninth Annual Report of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Ireland, Jr. -----	
**Tenth Annual Report of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Ireland, Jr. -----	
Eleventh Report (First Biennial) of the State Mineralogist, for the two years ending September 15, 1892, 612 pp., 73 illustrations, 4 maps. William Ireland, Jr. -----	1.50
**Twelfth Report (Second Biennial) of the State Mineralogist, for the two years ending September 15, 1894, 541 pp., 101 illustrations, 5 maps. J. J. Crawford -----	
**Thirteenth Report (Third Biennial) of the State Mineralogist, for the two years ending September 15, 1896, 726 pp., 93 illustrations, 1 map. J. J. Crawford -----	
Chapters of the State Mineralogist's Report XIV, Biennial Period, 1913-1914, Fletcher Hamilton :	
**Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties, 172 pp., paper -----	
Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties, 208 pp., paper -----	.75
**Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties, 59 pp., paper -----	
**Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper -----	
**Mines and Mineral Resources of Imperial and San Diego Counties, 113 pp., paper -----	
**Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties, 180 pp., paper -----	
Fourteenth Report of the State Mineralogist, for the Biennial Period 1913-1914, Fletcher Hamilton, 1915 :	
**A General report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth -----	
Chapters of the State Mineralogist's Report XV, Biennial Period, 1915-1916 Fletcher Hamilton :	
**Mines and Mineral Resources, Alpine, Inyo and Mono Counties, 176 pp., paper -----	
**Mines and Mineral Resources, Butte, Lassen, Modoc, Sutter and Tehama Counties, 91 pp., paper -----	
Mines and Mineral Resources, El Dorado, Placer, Sacramento and Yuba Counties, 198 pp., paper -----	.75

REPORTS—Continued

Asterisks (**) indicate the publication is out of print.

	Price Postpaid
Mines and Mineral Resources, Monterey, San Benito, San Luis Obispo, Santa Barbara and Ventura Counties, 183 pp., paper-----	\$0.75
**Mines and Mineral Resources, Los Angeles, Orange and Riverside Counties, 136 pp., paper-----	----
**Mines and Mineral Resources, San Bernardino and Tulare Counties, 186 pp., paper-----	----
**Fifteenth Report of the State Mineralogist, for the Biennial Period 1915-1916, Fletcher Hamilton, 1917:	
A General Report on the Mines and Mineral Resources of Alpine, Inyo, Mono, Butte, Lassen, Modoc, Sutter, Tehama, Placer, Sacramento, Yuba, Los Angeles, Orange, Riverside, San Benito, San Luis Obispo, Santa Barbara, Ventura, San Bernardino and Tulare Counties, 990 pp., 413 illustrations, cloth-----	----
Chapters of the State Mineralogist's Report XVI, Biennial Period, 1917-1918, Fletcher Hamilton:	
Mines and Mineral Resources of Nevada County, 270 pp., paper-----	1.00
Mines and Mineral Resources of Plumas County, 188 pp., paper-----	.75
Mines and Mineral Resources of Sierra County, 144 pp., paper-----	.75
Seventeenth Report of the State Mineralogist, 1920, 'Mining in California during 1920,' Fletcher Hamilton; 562 pp., 71 illustrations, cloth-----	2.50
Eighteenth Report of the State Mineralogist, 1922, 'Mining in California,' Fletcher Hamilton. Chapters published monthly beginning with January, 1922:	
**January, **February, March, April, **May, June, July, August, September, October, November, December, 1922-----	.40
Chapters of Nineteenth Report of the State Mineralogist, 'Mining in California,' Fletcher Hamilton and Lloyd L. Root. January, February, March, September, 1923-----	.40
Chapters of Twentieth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly. January, April, October, 1924, per copy, 30¢; July, per copy-----	.40
Chapters of Twenty-first Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1925, Mines and Mineral Resources of Sacramento, Monterey and Orange Counties-----	.40
April, 1925, Mines and Mineral Resources of Calaveras, Merced, San Joaquin, Stanislaus and Ventura Counties-----	.40
**July, 1925, Mines and Mineral Resources of Del Norte, Humboldt and San Diego Counties-----	----
**October, 1925, Mines and Mineral Resources of Siskiyou, San Luis Obispo and Santa Barbara Counties-----	----
Chapters of Twenty-second Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
**January, 1926, Mines and Mineral Resources of Trinity and Santa Cruz Counties-----	----
April, 1926, Mines and Mineral Resources of Shasta, San Benito and Imperial Counties-----	.40
July, 1926, Mines and Mineral Resources of Marin and Sonoma Counties-----	.40
**October, 1926, Mines and Mineral Resources of El Dorado and Inyo Counties, also report on Minaret District, Madera County-----	----
Chapters of Twenty-third Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1927, Mines and Mineral Resources of Contra Costa County; Santa Catalina Island-----	.40
April, 1927, Mines and Mineral Resources of Amador and Solano Counties-----	.40
**July, 1927, Mines and Mineral Resources of Placer and Los Angeles Counties-----	----
October, 1927, Mines and Mineral Resources of Mono County-----	.40
Chapters of Twenty-fourth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1928, Mines and Mineral Resources of Tuolumne County-----	.40

REPORTS—Continued

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	Price Postpaid
April, 1928, Mines and Mineral Resources of Mariposa County-----	\$0.40
July, 1928, Mines and Mineral Resources of Butte and Tehama Counties	.40
October, 1928, Mines and Mineral Resources of Plumas and Madera Counties -----	.40
Chapters of Twenty-fifth Report of the State Mineralogist, 'Mining in Cali- fornia,' Walter W. Bradley. Published quarterly:	
**January, 1929, Mines and Mineral Resources of Lassen, Modoc and Kern Counties; also on Special Placer Machines-----	----
**April, 1929, Mines and Mineral Resources of Sierra, Napa, San Fran- cisco and San Mateo Counties-----	----
July, 1929, Mines and Mineral Resources of Colusa, Fresno and Lake Counties -----	.40
October, 1929, Mines and Mineral Resources of Glenn, Alameda, Mendo- cino and Riverside Counties-----	.40
Chapters of Twenty-sixth Report of the State Mineralogist, 'Mining in Cali- fornia,' Walter W. Bradley. Published quarterly:	
January, 1930, Mines and Mineral Resources of Santa Clara County; also Barite in California-----	.40
**April, 1930, Mines and Mineral Resources of Nevada County; also Min- eral Paint Materials in California-----	----
**July, 1930, Mines and Mineral Resources of Yuba and San Bernardino Counties; also Commercial Grinding Plants in California-----	----
October, 1930, Mines and Mineral Resources of Butte, Kings and Tulare Counties; also Geology of Southwestern Mono County (Preliminary)	.40
Chapters of Twenty-seventh Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:	
January, 1931, Preliminary Report of Economic Geology of the Shasta Quadrangle. Beryllium and Beryl. The New Tariff and Nonmetallic Products. Crystalline Talc. Decorative Effects in Concrete-----	.40
April, 1931, Stratigraphy of the Kreyenhagen Shale. Diatoms and Sili- coflagellates of the Kreyenhagen Shale. Foraminifera of the Kreyen- hagen Shale. Geology of Santa Cruz Island-----	.40
**July, 1931. (Yuba, San Bernardino.) Feldspar, Silica, Andalusite and Cyanite Deposits of California. Note on a Deposit of Andalusite in Mono County; its occurrence and chemical importance. Bill creating Trinity and Klamath River Fish and Game District and its effect upon mining -----	----
October, 1931. (Alpine.) Geology of the San Jacinto Quadrangle south of San Geronio Pass, California. Notes on Mining Activities in Inyo and Mono Counties in July, 1931-----	.40
Chapters of Twenty-eighth Report of the State Mineralogist, 'Mining in Cali- fornia,' Walter W. Bradley. Published quarterly:	
January, 1932, Economic Mineral Deposits of the San Jacinto Quad- rangle. Geology and Physical Properties of Building Stone from Car- mel Valley. Contributions to the Study of Sediments. Sediments of Monterey Bay. Sanbornite -----	.40
**April, 1932. Elementary Placer Mining Methods and Gold Saving Devices. The Pan, Rocker and Sluice Box. Prospecting for Vein Deposits. Bibliography of Placer Mining -----	----
Abstract from April quarterly: Elementary Placer Mining Methods and Gold Saving Devices. Types of Deposits, Simple Equipment. Special Machines. Dry Washing. Black Sand Treatment. Marketing of Products. Placer Mining Areas. Laws. Prospecting for Quartz Veins. Bibliography (mimeographed)-----	.25
July-October. (Ventura.) Report accompanying Geologic Map of North- ern Sierra Nevada. Fossil Plants in Auriferous Gravels of the Sierra Nevada. Glacial and Associated Stream Deposits of the Sierra Nevada. Jurassic and Cretaceous Divisions in the Knoxville-Shasta Succession of California. Geology of a Part of the Panamint Range. Economic Report of a Part of the Panamint Range. Acquiring Min- ing Claims Through Tax Title. The Biennial Report of State Min- eralogist -----	.75

REPORTS—Continued

Asterisks (**) indicate the publication is out of print.

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Chapters of Report XXIX, 1933 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January-April. Gold Deposits of the Redding and Weaverville Quadrangles. Geologic Formations of the Redding-Weaverville District, Northern California. Geology of Portions of Del Norte and Siskiyou Counties. Applications of Geology to Civil Engineering. The Lakes of California. Discovery of Piedmontite in the Sierra Nevada. Tracing 'Buried River' Channel Deposits by Geomagnetic Methods. Geologic Map of Redding-Weaverville District, showing gold mines and prospects. Geologic Map showing various mines and prospects of part of Del Norte and Siskiyou Counties-----	\$1.00
July-October. Gold Resources of Kern County. Limestone Deposits of the San Francisco Region. Limestone Weathering and Plant Associations of the San Francisco Region. Booming. Death Valley National Monument, California. Placer Mining Districts, Senate Bill 480. Navigable Waters, Assembly Bill 1543-----	1.00
Chapters of Report XXX, 1934 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Resurrection of Early Surfaces in the Sierra Nevada. Geology and Mineral Resources of Northeastern Madera County. Geology and Mineral Deposits of Laurel and Convict Basins, Southwestern Mono County. Notes on Sampling as Applied to Gold Quartz Deposits-----	.60
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Chapters of Report XXXI, 1935 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Review of Gold Mining in East-Central, 1934. Current Mining Activities in the San Francisco District with Special Reference to Gold. Geological Investigation of the Clays of Riverside and Orange Counties, Southern California. Information regarding Mining Loans by the Reconstruction Finance Corporation-----	.60
April. A Geologic Section Across the Southern Peninsular Range of California. New Technique Applicable to the Study of Placers. Grub-stake Permits-----	.60
July. Mines and Mineral Resources of Siskiyou County (with map). Dams for Hydraulic Mining Debris. Leasing System as Applied to Metal Mining. Mine Financing in California. New Laws Make Radical Change in Mining Rights-----	.60
October. Mines and Mineral Resources of San Luis Obispo County. Mineral Resources of Portions of Monterey and Kings Counties. Mining Activity at Soledad Mountain and Middle Buttes—Mojave District, Kern County. Geology of a Portion of the Perris Block, Southern California. Mineral Resources of a Portion of the Perris Block, Riverside County-----	.60
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Samples (limited to two at one time) of any mineral found in the State may be sent to the Division of Mines for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the State. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.

DETERMINATION OF MINERAL SAMPLES

When a sample of mineral is received for examination, the first step is to determine its nature and to identify it. This is done by a series of tests, which are described in the following paragraphs. The first test is to determine the color of the mineral. This is done by observing the color of the mineral in the light of a standard color chart. The second test is to determine the luster of the mineral. This is done by observing the way in which the mineral reflects light. The third test is to determine the hardness of the mineral. This is done by scratching the mineral with a series of standard minerals. The fourth test is to determine the cleavage of the mineral. This is done by observing the way in which the mineral breaks. The fifth test is to determine the fracture of the mineral. This is done by observing the way in which the mineral breaks when it is not along a cleavage plane. The sixth test is to determine the specific gravity of the mineral. This is done by weighing the mineral in air and in water. The seventh test is to determine the solubility of the mineral. This is done by observing whether or not the mineral dissolves in water. The eighth test is to determine the reaction of the mineral to acids. This is done by observing whether or not the mineral reacts with hydrochloric acid. The ninth test is to determine the reaction of the mineral to alkalis. This is done by observing whether or not the mineral reacts with sodium hydroxide. The tenth test is to determine the reaction of the mineral to other reagents. This is done by observing whether or not the mineral reacts with other reagents. The results of these tests are used to identify the mineral and to determine its nature.

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